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1980 J F WING, S L WALTON N00014-75-C-0711

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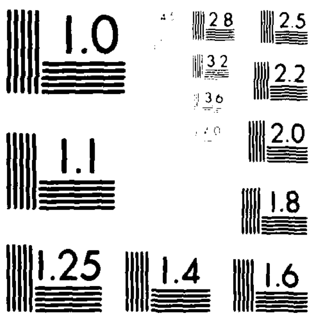

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DEFENSE UTILITY OF COMMERCIAL VESSELS AND CRAFT,

(9) Final rept,

Prepared by the

Committee on Defense Utility of Commercial Maritime Assets

of the

Maritime Transportation Research Board

Commission on Sociotechnical Systems

National Research Council

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NOTICE: The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the Councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The members of the Committee responsible for the report were chosen for their special competences and with regard for appropriate balance.

This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

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FOREWORD

This study was made under the auspices of the Maritime Transportation Research Board (MTRB) of the National Research Council, as part of the continuing program of advice to the federal government, directed toward improving maritime and maritime-related transportation. This study was undertaken at the request of MTRB's sponsors.

Assessing the defense utility of a wide variety of vessels and craft that are not included in current military contingency planning required a diversity of backgrounds and maritime experience. Accordingly, an interdisciplinary committee was formed. The areas of competence represented on this Committee include: ship design (naval architecture and marine engineering); marine transportation systems analysis; port and terminal operations; materials handling operations; vessel operations--specifically including deepsea tug-barge, offshore service and supply, commercial fishing, marine salvage, and oceanographic research and survey operations; military logistics planning; and maritime law. Liaison representation was provided by the Coast Guard, Maritime Administration, Military Sealift Command, Military Traffic Management Command, Office of the Chief of Naval Operations, David W. Taylor Naval Ship R&D Center, Marine Corps, Center for Naval Analyses, and Federal Emergency Management Agency. John F. Wing, Senior Vice President, Transportation Consulting Division, Booz-Allen & Hamilton, served as Committee Chairman.

A three-man committee, comprising Messrs. Donald P. Courtsal, Thomas B. Crowley, and Owen H. Oakley, reviewed this report on the Board's behalf.

I extend my thanks to the Committee Chairman and members, liaison representatives, and project manager for their fine work on this report. My thanks go also to the Board's review committee.

RRO'Neill

R. R. O'NEILL
Chairman
Maritime Transportation Research Board

June 1979

PREFACE

This report identifies military functions, required in an emergency or mobilization, whose performance may require the use of vessels and craft that normally are not included in contingency planning; and describes the types, characteristics, and potential availability of vessels and craft that appear to have utility for these functions. To our knowledge a broad compendium and assessment of privately-owned ships and craft, other than large cargo ships, has not been undertaken before. Although the principal purpose of this work is to provide a reference book for government planners, its usefulness goes far beyond contingency planning. It is a source book for the entire maritime industry, including operators, designers, shipbuilders, suppliers, regulators, and researchers.

This report was developed by a committee of maritime industry leaders, who took substantial time from busy schedules to contribute ideas, compile data, and prepare the draft. The liaison representatives participated actively in this project and made a number of significant contributions to this work. We are pleased to have been asked to serve on this project and will support future work of the Maritime Transportation Research Board.

We particularly thank Messrs. Lynn Walton and Randolph King of the Maritime Transportation Research Board, the liaison representatives, and the many industry specialists who assisted the Committee in its work.

John F Wing

JOHN F. WING
Chairman
Committee on Defense Utility of
Commercial Maritime Assessments

February 1979

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Committee members serve as individuals, contributing their personal knowledge and judgment, and not as representatives of any organization by which they are employed or with which they may be associated. Liaison representatives attend for their respective organizations to provide information or opinions on issues under discussion, but have no vote on conclusions and recommendations.

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DEFENSE UTILITY OF

COMMERCIAL VESSELS AND CRAFT

1

EXECUTIVE SUMMARY

National Defense rests on the nation's ability to act quickly and decisively to protect its citizens and allies. An effective maritime mobilization system is one that insures the availability of vessels in the right places quickly enough to meet defense emergencies and is equitable to the affected commercial interests.

This report was prepared by the Maritime Transportation Research Board's Committee on Defense Utility of Commercial Maritime Assets (DUCMA) at the request of MTRB's sponsors (the Maritime Administration, Military Sealift Command, Military Traffic Management Command, and Coast Guard) for two purposes. The first was to identify those functions within emergency operations that could be performed by merchant vessels and craft and the second was to identify the types and capabilities of potentially available vessels and craft (excluding those already included in current contingency planning) that appear to have utility for those functions.

Those two purposes have been accomplished. The Committee members and liaison representatives researched potential military needs and defined 13 such functions in combat, logistic, and support operations as follows:

- Intra-theater shipping
- Overseas inland waterway operations
- Port operations
- Port safety and security
- Logistics over-the-shore (LOTS)
- Amphibious operations
- Fleet maintenance and support
- Dredging
- Towing
- Salvage
- Search and rescue (SAR)
- Aids-to-navigation support

- Ice operations.

These functions are described in Part II (Chapter 4) of the report together with a summary of the process by which government agencies obtain commercial vessels and craft by either:

- Voluntary commercial charter, or
- Requisition of use or title.

Under each method the role and responsibility of each of the following involved government agencies are described:

- Military Sealift Command (MSC)
- Military Traffic Management Command (MTMC)
- the Military Services
- Coast Guard
- Department of Defense Activities
- Joint Chiefs of Staff (JCS)
- Joint Transportation Board (JTB)
- JCS Unified and Specified Commands
- Office of the Secretary of Defense (OSD)
- Office of the Assistant Secretary of Defense for Manpower, Research Affairs, & Logistics (OSD[MRA&L])
- Maritime Administration (MarAd)
- National Shipping Authority (NSA)
- Federal Emergency Management Agency (FEMA).

The DUCMA Committee also researched the numbers and characteristics of vessels and craft that might meet the requirements of the military functions. Extensive information has been assembled in Part III (Chapters 5 through 9) of this report on 17 types of commercial vessels and craft. These types are:

- Ocean-Classed Tugs
- Ocean-Classed Barges
- Crane and Derrick Barges
- Offshore Service and Supply Vessels
- Drillships and Semisubmersibles
- Tuna Boats
- Menhaden Vessels
- King Crab Vessels
- Trawlers and Groundfishing Vessels
- Shrimp Boats
- Oceanographic Research Vessels
- Dredges
- Floating Drydocks
- Motor Yachts
- Passenger-Vehicle Ferries
- Marine Salvage Vessels
- Advanced Marine Vehicles (air cushion vehicles, surface effect ships, and hydrofoils)

The information included for each vessel type comprises an industry description, a discussion of the availability of those vessels for military use, manning considerations, and vessel descriptions. Further, in Appendix A, detailed Vessel Characteristics forms for 60 classes of vessels (covering nearly all of the types described) are included, together with 43 illustrations. Appendix B lists vessel owners, operators, and associations as a reference for further information on vessel availability and characteristics. Appendix C is a selective bibliography of additional references and data files on vessels and craft.

Thus, this report constitutes an extensive source of information for government planners and commercial organizations. The DUCMA Committee drew the following principal conclusions on the assembled information:

- There are more than 21,200 U.S.-owned vessels and small craft, not now included in military contingency planning, which are available to meet some emergency combat, logistic, and support needs. These include more than 8,200 commercial vessels and about 13,000 Coast Guard Auxiliary vessels, most of which are pleasure craft. Based on their capacity, endurance, speed, and seakeeping capability, the most notable are 1,239 offshore service and supply vessels; 172 ocean-classed tugs, 186 ocean-classed transport barges, and 10 integrated tug-barge systems; over 5,600 fishing vessels; and 95 research vessels. Many tugs, fishing vessels, and motor yachts--among others--served well in World War II.
- Table 1-1 shows each of the 17 principle types researched and its general suitability to the 13 military functions defined.
- The data on vessel numbers, characteristics, locations, and availability is accurate enough for evaluating classes of vessels and industry sectors. However, specific vessel information must be obtained or verified by direct contact with owners or operators.

The Committee recommended that the liaison between the government and industry representaives, successfully established on this project, be continued and that the information in the report be reviewed and updated periodically to maintain its current value.

Table 1-1 depicts the suitability of the candidate vessel types for each general type of military function. Its purpose is to give the military planner an initial indication of the most likely vessel types that could meet general mission requirements. These evaluations of suitability are necessarily subjective. Each represents an average rating for the wide variety of vessels included within that vessel type. More specific information on vessel capabilities may be obtained by contacting one or more of the vessel operators and owners listed in Appendix B.

TABLE 1-1 Suitability of Vessel Types for Each Military Function[a]

Military Functions / Vessel Types[b]	Ocean-Classed Tugs	Ocean-Classed Barges	Crane and Derrick Barges	Offshore Service and Supply	Drillships and Semisubmersibles	Fishing: Tuna	Fishing: Menhaden	Fishing: King Crab	Fishing: Trawler and Groundfishing	Fishing: Shrimp	Oceanographic Research	Dredges	Floating Drydocks	Motor Yachts	Ferries	Marine Salvage Vessels	ACVs, SESs, and Hydrofoils[c]
1. Intra-Theater Shipping	X	X		X		X	X								X		
2. Overseas Inland Waterway Operations	X[d]	X		X		X	X	X	X	X					X		
3. Port Operations	X	X	X	X	X										X		
4. Port Safety and Security				X				X	X	X				X			X
5. Logistics Over-the-Shore (LOTS)	X	X	X	X	X												
6. Amphibious Operations				X													X
7. Fleet Maintenance and Support		X	X		X								X				
8. Dredging			X									X					
9. Towing	X			X												X	
10. Salvage	X	X	X	X	X						X					X	
11. Search and Rescue (SAR)	X			X		X	X	X	X	X	X			X			X
12. Aids-to-Navigation Support			X						X	X	X						
13. Ice Operations	X	X															

Coding: An "X" indicates general suitability of the vessel type for performing the specified military function.

[a]These evaluations of suitability are necessarily subjective. Each represents an average rating for the wide variety of vessels included within each vessel type. Thus, this *table's intended use is only as an index or point of departure in evaluating the suitability of any specific vessel for a specific mission.*

[b]Vessel types are listed in the same sequence as their treatment in the text (Chapters 6 through 9).

[c]Air cushion vehicles (ACVs) and surface effect ships (SESs).

[d]While inland towboats would, in many cases, be better suited, their use would require that they be transported to the site by oceangoing vessel or ocean-classed barge.

I

INTRODUCTION, CONCLUSIONS, AND RECOMMENDATIONS

2

INTRODUCTION

PURPOSE, SCOPE, AND PROJECT ORGANIZATION

This study was undertaken (a) to identify military functions required in contingencies whose performance may require the use of vessels and craft that are not normally included in current contingency planning, and (b) to identify the types, characteristics, and potential availability of vessels and craft that appear to have utility for these functions.

The intent is to provide information that will help both government and industry personnel in planning for and responding to emergency and mobilization situations. Thus, this report not only provides summary information to assist in the quick identification of types of vessels and craft of possible defense utility, but also lists sources of further, more detailed information on each type.

The scope of this study excludes consideration of (a) vessels owned or operated by the Department of Defense and the Coast Guard and (b) oceangoing commercial cargo ships, which are already included in national contingency planning.

Collectively, the Committee's approach included:

(1) identifying and defining general types of military functions, required in an emergency or mobilization, whose performance may require the use of vessels and craft that are not included in current contingency planning;

(2) identifying the vessel characteristics that are required for the successful performance of each of these functions;

(3) identifying the types of vessels and craft, not included in current contingency planning, having possible utility in performing each of these functions; and

(4) describing each type of vessel or craft in terms of (a) principal characteristics and basic capabilities; (b) numbers of vessels, geographic distribution, and principal owners or operators; and

(c) potential availability, including considerations of manning and the possible economic impact of their withdrawal from the commercial sector.

INFORMATION SOURCES

As background information, the Committee obtained copies of studies, technical papers, and statistical material published by government agencies, professional and technical societies, trade and industry associations, non-profit organizations, and commercial shipowners and operators.

Presentations were made to the Committee at several meetings. Five of the members prepared briefings on the industry sectors covering their respective expertise, namely, the offshore service and supply, deepsea tug and barge, fishing, marine salvage, and oceanographic research sectors. Additional information on these and the other sectors covered in this report was assembled by the members and project manager through personal and telephone interviews with knowledgeable industry and government personnel. The liaison representatives gave briefings on the types of military functions that can be performed by vessels and craft; the federal decision making process, chain of command, and conflict resolution procedures that would apply in procuring vessels and craft during an emergency or mobilization; and the statistical information on vessels and craft that is available from the publications and data banks of their respective agencies.

In conjunction with two of its meetings, the Committee was able to board and inspect a variety of offshore service and supply vessels in commercial service, and, during tours of three shipyards, to inspect a towing-supply vessel and tuna, king crab, and other fishing vessels in various stages of construction.

REPORT CONTENT AND ORGANIZATION

The Committee's principal conclusions and recommendations are summarized in Chapter 3.

In Chapter 4, the process of obtaining commercial vessels and craft for government use during an emergency or mobilization is summarized. Thirteen general types of military functions that could be performed by vessels and craft are defined, and the principal vessel capabilities that are essential in performing these missions are identified. A table summarizing the relative essentiality of various vessel capabilities for each military function is given (see Table 4-1).

Vessel information is given in Chapters 5 through 9. (For brevity, vessels and craft are referred to simply as "vessels" throughout the rest of this report.) In Chapter 5 is a table summarizing the capabilities of each vessel type described in Chapters 6 through 9 (see Table 5-1). The information included for each industry sector has been selected to give government and industry officials the most useful data that could be assembled to plan and implement commercial vessel acquisition. In describing each industry sector, the text follows a four-part outline: (a) Industry Description--overview, including normal

vessel uses, numbers of vessels by type and class, and by major owners or operators, and customary commercial arrangements; (b) Vessel Availability--geographic distribution of base ports and areas of operations, logistic support requirements, and economic and other considerations (i.e., the impact on the commercial sector of military acquisition); (c) Manning Considerations--normal time at sea, skills and training, nationality, and emergency availability of personnel; and (d) Vessel Description--vessel characteristics and principal capabilities. For each vessel type and class, Vessel Characteristics forms summarize 37 key characteristics; and, in most cases, an illustration of a typical vessel in each class is included (see Appendix A).

Chapter 6 examines ocean-classed tugs, ocean-classed barges (including specialized types of barges), and crane and derrick barges. Chapter 7 treats offshore service and supply vessels, drillships, and semisubmersibles used by the petroleum industry. Chapter 8 includes five sectors of the fishing industry: tuna, menhaden, king crab, trawler and groundfishing, and shrimp. Chapter 9 covers seven other sectors: oceanographic research vessels, dredges, floating drydocks, motor yachts, ferries, marine salvage vessels, and advanced marine vehicles (air cushion vehicles, surface effect ships, and hydrofoils).

Appendix A includes the Vessel Characteristics forms and vessel illustrations for the principal classes of vessels in each industry sector. These are accompanied by an index and definitions of the vessel characteristics covered. Vessel classes were selected on the basis of principal characteristics, such as length, horsepower, or other basic measures of capability.

The appendixes also include listings of principal vessel owners, operators, and associations (Appendix B); a selective bibliography (Appendix C); and contributors to the report (Appendix D).

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CONCLUSIONS AND RECOMMENDATIONS

This study was begun on the presumption that there is a large number of U.S.-owned vessels, too small, too specialized, or too dispersed to have been fully accounted for previously by military planners. Further, it was believed that many of these smaller vessels (i.e., smaller than the containerships, break-bulk vessels, dry bulk carriers, and tankers normally counted in the U.S. oceangoing merchant fleet) would be capable of performing many necessary and useful functions in time of limited emergency or mobilization. These presumptions have been confirmed in the performance of this study. This chapter summarizes the Committee's conclusions and recommendations.

CONCLUSIONS

(1) There is an extensive fleet of U.S.-owned vessels that is not now included in military contingency planning but is available to meet national emergencies or defense mobilization.

- The total number exceeds 21,200, including more than 8,200 commercial vessels and some 13,000 Coast Guard Auxiliary vessels.
- Thir mber includes vessels that can perform or assist in identifiec litary functions.
- Mos c the commercial vessels have endurance and seaworthiness character. ics that allow them to be deployed overseas under their own power or under tow. Some have a more limited range and would be suitable for U.S. coastal or harbor operations.
- In general, they have less speed and capability than the larger commercial vessels now included in military contingency planning or the specially designed ships of the U.S. Navy and U.S. Coast Guard.
- The vessels having the broadest potential utility based on considerations of capacity, endurance, speed, and seakeeping characteristics include:

- offshore service and supply vessels,
- deepsea tugs and transport barges,
- fishing vessels, and
- research vessels.

• A second group of highly specialized vessels includes:
- derrick, crane, and other specialized barges;
- oil exploration and offshore drilling vessels;
- dredging vessels;
- private motor yachts;
- floating drydocks; and
- passenger-vehicle ferries.

• The value of these vessels rests in a number of areas:
- immediate or near-term availability with little or no modification required,
- availability of crews who are trained and often available for overseas deployment for limited periods,
- normal operating areas, for some, near potential trouble spots abroad, and
- large numbers and geographic dispersion.

• Many vessels of these types served well in World War II, e.g., tugs, fishing vessels, motor yachts.

• Because of the great number, geographic dispersion, and variety of available vessels, the impact of a government acquisition on commercial operations will vary widely with the individual sector.

(2) Thirteen general military functions have been identified that could be filled in whole or in part by the types of vessels studied:

• Intra-theater shipping
• Overseas inland waterway operations
• Port operations
• Port safety and security
• Logistics over-the-shore (LOTS)
• Amphibious operations
• Fleet maintenance and support
• Dredging
• Towing
• Salvage
• Search and rescue (SAR)
• Aids-to-navigation support
• Ice operations.

Table 1-1 (page 6) depicts the suitability of the vessel types for each military function. Its purpose is to give the military planner an initial indication of the most likely vessel types that could meet general mission requirements. These evaluations of suitability are necessarily subjective. Each represents an average rating for the wide variety of vessels included within each vessel type. Thus Table 1-1 should be used only as a point of departure in identifying vessels that are potentially suitable for specific missions. More specific

information on vessel capabilities may be obtained by contacting one or more of the vessel operators and owners listed in Appendix B.

(3) This report provides eight basic information sources to the military planner. Three summary tables permit quick identification of:

- the suitability of vessel types for each military function (Table 1-1),
- the relative essentiality of vessel capabilities for each military function (Table 4-1), and
- the capabilities of each vessel type (Table 5-1).

The report also provides:

- a general description of each industry sector, covering basic vessel uses, manning, commercial arrangements, geographic distribution, and availability (Chapters 6 through 9);
- a Vessel Characteristics form that summarizes, for each vessel class, typical characteristics that are important for evaluation by military planners (Appendix A);
- general layout drawings or illustrations, where available, of each of the vessel classes (Appendix A);
- a listing of principal vessel owners, operators, and industry associations, with addresses, from whom more specific information can be obtained (Appendix B); and
- a selective bibliography of data sources for further reference (Appendix C).

(4) A single source of accurate, comprehensive data on the numbers, characteristics, capabilities, locations, and availability of all of these vessels does not exist.

- Many vessels, because of their small size, are not included in government information sources.
- There is a considerable administrative time-lag in incorporating new or changed vessel data into government information sources.
- Data available through private industry sources are, in many cases, neither current nor accurate enough for pinpointing specific vessels.
- In some industry sectors, current information is available only from individual owners, operators, or their industry associations.

(5) The information in this report should be used by military planners only as a guide to vessel characteristics and availability, and not as a specific reference of current vessels.

- Data are presented in the form of ranges, covering a number of vessels that fall within each class.
- Frequent changes occur in location, numbers, and characteristics of new and retired vessels.

• The composite of government and private data sources used in this report is, however, adequate to define gross vessel numbers and characteristics.

(6) For many of the industry sectors covered, the Coast Guard's information files, "Merchant Vessels of the United States" and "Ship Information Library," and the American Bureau of Shipping (ABS) Record are the most comprehensive existing public sources of vessel data. The most comprehensive information source for the offshore service and supply sector is the listing compiled by the Fleet Data Service; and, for the offshore tug-barge sector, the U.S. Army Corps of Engineers' annual Transportation Series 5. These and other public and private data sources are listed in Appendix C. The Coast Guard ship data banks would be more useful to military planners if (a) additional vessel characteristics were included, (b) data were kept more current, and (c) the current data bases were made more compatible.

RECOMMENDATIONS

(1) The liaison between representatives of the government and representatives of industry established during this project has proven very valuable to both groups and should be maintained on a periodic basis. The purpose of such communication would be two-fold: (a) to increase and update the military planners' knowledge of vessels that could have military utility in contingencies and (b) to increase the commercial vessel operators' knowledge of potential military needs and the procedures that would be used to requisition or charter their vessels in emergencies or mobilizations.

(2) Because the information in this report on vessel statistics and principal vessel operators is perishable, if it is to be of continuing value, this report should be updated periodically. Subsequent reports should consider the inclusion of additional vessel types, notably the inland towboat and barge fleets. At the same time, consideration should be given to the development of better data in several of the sectors covered, notably the fishing fleets. (Comprehensive and current data on these are particularly difficult to obtain because of the small size and dispersion of the fishing vessels, and the large numbers of inland towboats and barges.)

II

DEFENSE REQUIREMENTS

4

DEFENSE REQUIREMENTS FOR COMMERCIAL VESSELS AND CRAFT

The purpose of this section is to provide defense planners and private owners and operators with an understanding of the available legal options and the authority that could be invoked to obtain commercial vessels and craft in the event of an emergency or mobilization. It is intended only as a guide to understanding how such vessels and craft might be obtained and where, within the federal establishment, decisions concerning procurement might be made.

PROCESS OF OBTAINING COMMERCIAL VESSELS AND CRAFT

National defense rests on the nation's ability to act quickly and decisively to protect its citizens and allies. An effective maritime mobilization system is one that insures the availability of transportation resources in the right place at the right time to meet any defense emergency.

Current U.S. emergency plans provide for the exercise of both statutory and standby Presidential powers to regulate and direct the use of maritime resources as conditions require. Implicit in this philosophy is a maximum dependence on the private sector to perform voluntarily and under its own management. Government influence over commercial activity would be exerted only to the extent needed and, usually, through indirect means. Direct intervention in maritime operations would be only to the degree necessary to compensate for regular operating procedures that proved inadequate or failed to meet essential emergency demands.[1]

Methods

Maritime assets could be obtained for defense use in an emergency or mobilization in two general ways, with priority given to the first: (a) voluntary commercial charter; and (b) requisition of use or title.[2]

Voluntary Commercial Charter

Under the Armed Services Procurement Act, the Departments of the Army, Navy, and Air Force, and the U.S. Coast Guard (which, while part of the Department of Transportation, operates as part of the Navy during wartime) have statutory authority to contract for lease or acquisition of property or services for vessels, floating equipment, accessories, and equipment.[3] Lease or purchase contracts may be either negotiated or formally advertised. Although formal advertising is established as basic policy for all Department of Defense (DOD) lease or purchase actions, direct negotiations are permitted under 17 exceptions specified in the Act. Of primary interest, for purposes of this report, are the exceptions governing in situations where:

(1) It is determined that such action is necessary in the public interest during a national emergency declared by Congress or the President;
(2) The nature of the emergency or mobilization does not allow enough time for advertising; or
(3) The nature of the needed property or service makes it impracticable to let a contract through advertised competitive bidding.[4]

The form of contract or charter would vary, depending on (a) the type of property or service and (b) the function for which it would be used. Time, voyage, and bareboat are the normal types of charter.

Since the potential uses for maritime assets cover numerous defense agency functions, it is possible that the commercial maritime owner or operator could be contacted by any one of a number of defense activities both in the continental United States and overseas. For sealift requirements (inter-theater, intra-theater, and coastwise movements), contact usually would originate with the Military Sealift Command (MSC), the single DOD "common user" manager for sealift. The designated federal claimant agencies for emergency preparedness planning are listed in FPC 6,[5] and general guidance for resource management in national emergencies is contained in OEP 8500.5.[5] In the absence of voluntary agreement for the use of a commercial maritime property or service, other actions such as requisitioning could be employed. A proposed Executive Order permitting immediate requisitioning of ocean vessels in an emergency is now under consideration by the Office of Management and Budget. It was developed by the Maritime Administration (MarAd), and has been concurred in by the Office of the Secretary of Defense (OSD) and the Federal Preparedness Agency (FPA).

Requisition of Use or Title

There are many specific legal authorities under which the various federal agencies can prepare for and operate in a crisis, national emergency, or mobilization.[6] For the purposes of this study, the key authority is contained in Section 902(a) of the Merchant Marine Act of 1936, as amended in 1939.[7] Under this authority, the Secretary of Commerce is authorized to requisition U.S.-owned vessels, whether registered under the U.S. flag or foreign flags, whenever the President proclaims that the security of the nation makes it advisable <u>or</u> during any national emergency declared by proclamation of the President.[8]

Vessels may be requisitioned either for title or for use. When a vessel must be substantially modified or converted to meet military requirements, or in certain other cases, requisitioning for title may be appropriate. In general, however, requisitioning for use is the more practical and desirable course, from the viewpoint of the government and of the vessel owner. When a vessel is requisitioned for use, a time charter is executed.[9]

The requisitioning process for involuntary acquisition is more complex and involves a greater number of participants than does voluntary commercial charter. This method would not normally be invoked for the types of vessels considered in this study. The requisitioning process is depicted in Figure 4-1. The need for requisitioning the vessels could originate from any of a number of sources:

(1) the Transportation Operating Agencies (TOAs), i.e., the Military Sealift Command (MSC) and Military Traffic Management Command (MTMC);

(2) the Military Services (Coast Guard requirements would be included within those of the Navy during wartime);

(3) DOD Activities;

(4) the Joint Chiefs of Staff's (JCS) Unified and Specified Commands; or

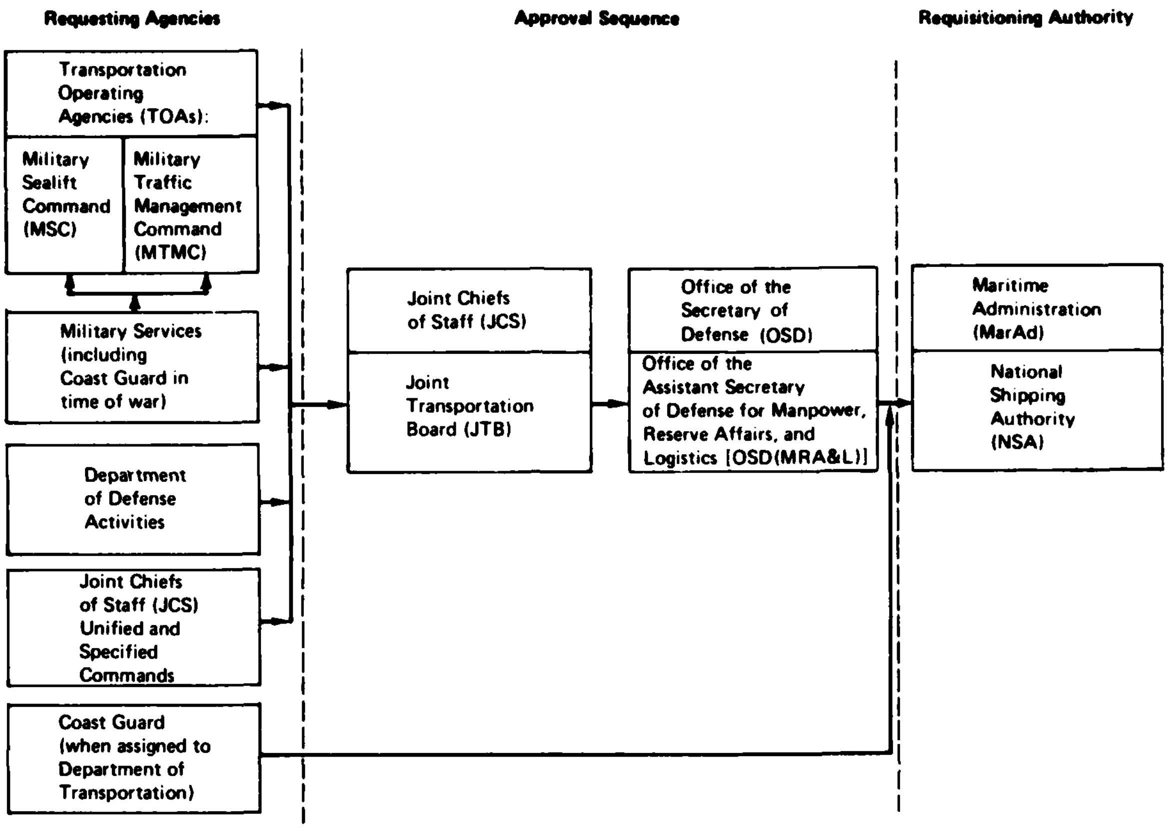
(5) Coast Guard (when under the Department of Transportation, during a non-mobilization emergency).

Unified and specified commands may develop movement requirements that involve vessels that are under the jurisdiction of the TOAs. These are submitted to the parent service, which is responsible for submitting the requirements to the TOAs. Other requirements for requisitioning would be direct to the JCS. The JCS, through its Joint Transportation Board (JTB), would:

(1) Review and evaluate requirements (i.e., examine other options) and the ability of the services and TOAs to meet these requirements;

(2) Allocate, as required, the capabilities of the services to fulfill these requirements; and

FIGURE 4-1 Vessel requisitioning process



(3) Submit the requirements and recommendations for requisitioning to the Secretary of Defense.[10]

The Office of the Assistant Secretary of Defense for Manpower, Reserve Affairs, and Logistics--OSD (MRA&L)--would receive the JCS recommendations and request that MarAd requisition the vessels. The Assistant Secretary of Commerce for Maritime Affairs has been delegated the authority of the Secretary of Commerce for requisitioning in accordance with Section 902 of the Merchant Marine Act. The actual requisitioning would be accomplished by the National Shipping Authority (NSA), the emergency shipping operations agency of MarAd.[11]

A requisitioned vessel may be operated by the NSA in military support operations or civil shipping operations, or it may be placed under operational control of an agency of the DOD, usually the MSC.

Payment Provisions

Charter Compensation

The NSA is responsible for payment of charter hire to owners and would recover costs from the DOD. Owners would receive just compensation for

the use of their vessels, as provided in the Merchant Marine Act, as amended.[9]

Disruption of Trade

Disruption of trade in emergencies or mobilizations is recognized to be inevitable. MarAd is responsible for minimizing the impact of requisitioning on other users and on the owners of the requisitioned vessels. However, because the Merchant Marine Act provides that "The owners shall not be paid for any consequential damages arising from the taking or use of property under the authority of this section,"[8] there is no compensation for loss of business as the result of a vessel's being out of the owner's service.

War Risk Insurance

The National Shipping Authority would provide hull, protection and indemnity (P&I), and second seamen's insurance for vessels requisitioned for charter by the government. Certain other insurances also would be provided.[12] Vessels requisitioned by title would not be insured, and any loss would be assumed by the government. (Owners would have received compensation at the time the vessels were acquired by the government.)

Resolution of Priorities

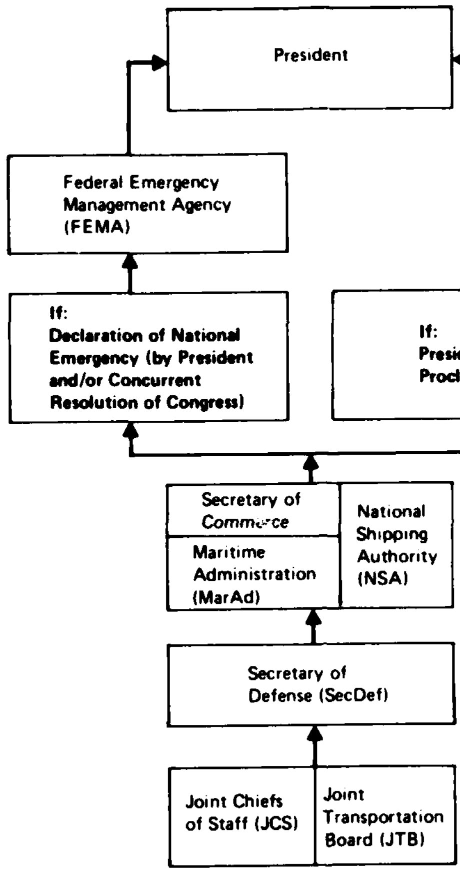
The resolution of conflicting priorities for use of maritime assets occurs at successive stages in the requisitioning process. The resolution process involves a number of federal organizations with varying responsibilities exercised under differing authorities and operations. Primarily, requisitioning authority is used (a) when a national emergency is declared by the President or Congress;[13] or (b) when the President proclaims that the security of the national defense makes it advisable.[8] The successive stages of authority and responsibility are shown in Figure 4-2.

National Emergency Procedures and Responsibilities

Appropriate controls, applicable to all modes of U.S. civil transportation, both domestic and international, would be placed in effect, as required, upon declaration of a national emergency by the President and/or a concurrent resolution of Congress.

The Federal Preparedness Agency (FPA)--soon to become the Federal Emergency Management Agency (FEMA)--would become the central programming agency for all resource management. Acting as the staff arm of the President, FPA is responsible for determining policy for and coordinating the emergency plans and programs of transportation agencies and operations as well as those of other relevant federal agencies. The

FIGURE 4-2 Hierarchy of authority and responsibility for resolving priorities in vessel requisitioning



basic responsibilities of the FPA are described in Executive Order 11051, as amended; and other department and agency assignments in emergencies are described in Executive Order 11490 as amended for Emergency Preparedness.[14]

Prior to Presidential involvement, FPA also mediates conflicting claims among various national resource managers. For example, the Department of Commerce and the Department of Agriculture might demand the same maritime resources simultaneously, the former for oceanborne transportation and the latter for food production. Similar conflicts among other agencies could stem from the classification of vessels. For example, is a fishing vessel more accurately classified as a transportation vessel or as food-producing equipment? Is an offshore oil service and supply vessel an energy-producing vessel or a transportation vessel?

As the federal resource agency for shipping, MarAd is responsible not only for control of all shipping (including, generally, all the types of vessels covered in this study), but also for the timely assignment of specific vessels to claimants.[15] The grounds for

assignment include (a) national requirements, (b) essential military requirements, (c) foreign assistance, (d) emergency procurement programs, and (e) other programs essential to the civilian economy. This function would be performed by the NSA, which would be staffed with experienced personnel from the shipping industry, who would allocate wartime assets within the framework of national priorities.

The JCS and the Secretary of Defense are responsible for examination of other possible defense alternatives. Considerations would include (a) the urgency of the military need; (b) priority of the need in comparison with other DOD requirements; (c) alternative methods of carrying out the mission, such as allocation or reallocation of defense-owned assets; (d) changing the mission; and (e) the relative appropriateness of using the commercial service or equipment.

Presidential Proclamation Procedures and Responsibilities

In situations short of mobilization or declaration of national emergency, the resolution of conflicting priorities would be accomplished under different authority and with fewer federal participants in the deliberations. As noted above, the President has authority to determine that U.S. commercial vessels should be requisitioned for charter or purchase without proclaiming a national emergency. In these instances, approval from the President would be obtained by the Secretary of Commerce at the request of the Secretary of Defense. Resolution of conflicts would be made among the three.

THE MILITARY FUNCTIONS

The range of possible uses for the vessels and services covered in this report includes the full spectrum of U.S. military and Coast Guard functions from combat to logistic operations. This report addresses these 13 general functions:

- Intra-Theater Shipping
- Overseas Inland Waterway Operations
- Port Operations
- Port Safety and Security
- Logistics Over-the-Shore (LOTS)
- Amphibious Operations
- Fleet Maintenance and Support
- Dredging
- Towing
- Salvage
- Search and Rescue (SAR)
- Aids-to-Navigation Support
- Ice Operations

Table 4-1 displays the relative essentiality (or desirability) of vessel capabilities for each of these military functions. The vessel capabilities listed in the table are identical to those shown on the

TABLE 4-1 Relative Essentiality of Vessel Capabilities for Each Military Function

Vessel Capabilities[a] / Military Functions	Intra-Theater Shipping	Overseas Inland Waterway Operations	Port Operations	Port Safety and Security	Logistics Over-the-Shore (LOTS)	Amphibious Operations	Fleet Maintenance and Support	Dredging	Towing	Salvage	Search and Rescue (SAR)	Aids-to-Navigation Support	Ice Operations
A. *General Service Particulars*													
1. Normal Service Functions	–	–	2	–	–	–	–	2	2	–	–	–	2
2. Length, Beam, Depth, Draft, Overall Height Above Water	2	2	2	2	2	2	1	2	1	2	–	2	–
3. Propulsion Type, Total Horsepower, Fuel Requirement	1	1	1	1	1	1	–	–	2	2	1	1	2
4. Cruising/Maximum Speeds	1	–	–	2	–	1	–	–	1	–	2	–	–
5. Endurance	2	1	–	2	–	1	–	–	1	2	2	2	2
6. Required Crew Complement, Total Accommodations	1	–	–	–	–	–	2	2	1	2	1	1	–
7. Maximum Sea State	2	–	–	–	2	1	–	–	1	–	–	1	–
8. Vessel Maneuverability	–	2	2	2	1	1	–	–	1	2	1	–	–
9. Cargo Capacity (on deck/below deck; dry/liquid)	2	2	2	–	2	2	2	2	–	1	–	1	–
10. Dry Stores Capacity	1	1	–	–	1	–	–	–	–	–	–	–	–
11. Reefer Capacity	1	1	–	–	1	–	–	–	–	–	–	–	–
12. Clear Cargo Area (on deck/below deck)	2	2	2	–	2	2	2	2	1	1	–	2	–
13. Average Deck Strength	2	2	1	–	2	1	–	–	–	1	–	2	–
14. Cargo or Materials Handling Capacity	2	2	2	–	2	–	–	–	–	1	–	2	–
15. Navigation and Communications Equipment Installed	1	1	1	2	1	1	–	–	1	2	2	2	1
16. Year Built, Hull Material	–	–	–	–	–	–	–	–	1	–	–	–	2

18. Fresh Water Making and Washdown Capability	–	–	–	–	1	1	1	–	–	1	–	–	–
19. External Firefighting Capability	1	1	1	1	–	–	–	–	–	1	1	–	–
20. Tow Winch, Bollard Pull	1	1	1	–	1	1	–	–	2	2	2	1	–
21. Helipad	1	1	1	1	1	1	1	–	–	–	1	–	–
22. Ice Strengthening	–	–	–	–	–	–	–	1	–	–	–	1	2
23. Miscellaneous Features	1	1	1	–	1	1	1	–	–	1	–	–	–
B. *Vessel Adaptability*													
24. Convertibility of Tanks for Fuel or Other Liquids	1	1	–	1	1	–	1	–	–	–	–	–	–
25. Additional Passenger Berths	1	1	–	–	1	1	1	–	–	–	–	–	–
26. Container Capacity	2	2	1	–	2	1	–	–	–	–	–	–	–
27. Maintenance and Repair Facilities	–	–	1	–	–	1	2	2	–	1	–	1	–
28. Special Cargo Carriage	1	1	–	–	1	–	–	–	–	–	–	–	–
29. Portable Crane Mountable	1	1	2	–	2	–	–	–	–	2	–	1	–
30. Underway Replenishment	1	–	–	–	–	–	–	–	–	–	–	–	–
C. *Barge Characteristics Only*													
32. Configuration of Bow	1	1	1	–	1	–	–	–	2	–	–	–	2
33. Compartmentation Below Deck	1	–	2	–	1	–	–	–	1	–	–	–	–
34. Type of Skegs	1	–	1	–	1	1	–	–	1	–	–	–	1
D. *Derrick/Crane Barge Characteristics Only*													
36. Capacity in Each Mode	–	–	2	–	–	–	–	–	–	–	–	–	–
E. *Dredge Characteristics Only*													
37. Capacity of Main Equipment	–	–	–	–	–	–	–	2	–	–	–	–	–

Coding	Importance of Vessel Capability to Performance of Military Functions
2	= Essential
1	= Desirable but Non-Essential
(blank)	= Very Limited or None

[a]Numbering system corresponds to that used on Vessel Characteristics forms (Appendix A).

Vessel Characteristics forms included in Appendix A. In describing the vessels and craft, the indicated essentiality of each characteristic is intended only as a general guide to military planners. This cannot substitute for a knowledge of the specific operational requirements of the intended mission.

Intra-Theater Shipping

Intra-theater shipping has the objective of providing a cargo transport capability to U.S. forces. When the military situation dictates and the amount of cargo to be lifted does not warrant the use of large break-bulk ships or containerships, shallow-draft oceangoing vessels of various types may be required. Such vessels include tugs and barges, shallow-draft tankers, and freight supply vessels. Tugs are used to tow barges and oversized floating structures, such as DeLong piers. Barges with bladders for petroleum, as well as dry cargo capability, are sometimes used to deliver cargo to shallow water areas, such as the west and north slopes of Alaska. Tankers and oil barges with a draft of 6.1 m (20 ft) or less and a capacity of 3,200 to 8,000 cu m (20,000 to 50,000 bbl) are used to deliver petroleum to coastal tank farms.

Principal vessel characteristics to be considered for intra-theater shipping in military operations include: (a) range and endurance, (b) draft, (c) cargo stowage and discharge capability, (d) deck strength, and (e) maximum sea state in which the vessel can operate.

Overseas Inland Waterway Operations

Inland waterways normally are used for military purposes in underdeveloped areas where alternate modes are either lacking or inadequate. Inland waterway operations permit the military to move large quantities of cargo, especially heavy or outsized loads.

In this report, consideration is restricted to overseas inland waterway operations, for two main reasons. First, a study of U.S. inland waterway operations was recently completed. (See Military Traffic Management Command, Transportation Engineering Agency, An Analysis of CONUS Inland Waterways for National Defense, MTMC Report OA 77-11; Washington: Department of Defense, September 1978.) Second, while data are available on the large numbers of U.S. inland towboats and barges, these were excluded because of this study's general focus on vessels classed for ocean service (although several obvious exceptions are included, e.g., dredges and many of the vessels in the "motor yachts" category).

The U.S. vessels most readily available to perform this function overseas, at least initially, would be ocean-classed tugs and barges. While inland towboats would, in many cases, be better suited, their use would require that they be transported to the site by oceangoing vessel or ocean-classed barge.

Most overseas inland waterway operations involve the movement of cargo from an ocean terminal to an inland discharge or transfer point that is not accessible by deep-draft ships. If the cargo is delivered

to the ocean terminal in preloaded barges or lighters carried aboard ships (LASH or SeaBee vessels), tugs (or towboats) would be used to move the preloaded barges to the inland discharge terminal and return the empty barges to the ocean terminal for reloading aboard ship. The barge-to-tug (or barge-to-towboat) ratio of the tows would vary with the type of ocean terminal operation and the characteristics of the waterway. In addition to tugs (or towboats) and barges, shallow-draft vessels and craft may be used.

Principal vessel characteristics to be considered for inland waterway operations include: (a) maneuverability, (b) cargo discharge capability, (c) draft, (d) cargo capacity, (e) deck strength, (f) horsepower, and, in the case of towboats or barges not classed for ocean service, (g) transportability to the overseas theater.

Port Operations

Port operations involve those services associated with the command and control of the port, mooring assistance, and unloading and transfer of cargo and passengers from both deep-draft and shallow-draft vessels. General-purpose harbor craft are used for command and control and for assistance in mooring ships in the harbor. They also augment port security and provide limited towing services to shift barges and cranes. Tugboats assist in mooring ships and provide the power for towing large barges and lighters. Smaller vessels and craft also may be used to expedite the discharge of cargo from vessels in stream and the transfer of cargo between piers or to storage areas outside the immediate terminal area.

The principal vessel characteristics to be considered for port operations depend on the general mission for which the craft is to be used, i.e., cargo handling or port services. For cargo handling operations, principal vessel characteristics to be considered include: (a) maneuverability, (b) draft, (c) cargo handling capabilities, (d) cargo stowage area, and (e) open deck space. For port operations, principal vessel characteristics to be considered include: (a) power, (b) draft, (c) bollard pull, (d) maneuverability, and (e) communications.

Port Safety and Security

Port safety and security operations are designed to safeguard vessels, harbors, ports, and waterfront facilities from damage or destruction from sabotage, subversive acts, accidents, or other causes. The vessels that carry out these operations must be capable of conducting both day and night harbor patrols of anchorage areas, restricted water areas, waterfront facilities, bridges, and the water areas above tunnels. During periods of war or national emergency, 24-hour patrols may be required. These vessels also may be employed to inspect other vessels and facilities; to investigate any reports of law violation, threatened sabotage, or other danger to vessels; to conduct the waterside

surveillance of vessels; and to furnish water transportation in connection with port security and law enforcement programs.

Principal vessel characteristics to be considered for port safety and security operations include: (a) communications, (b) fire fighting capability, (c) range, (d) speed, (e) draft, and (f) maneuverability.

Logistics Over-the-Shore (LOTS)

Logistics over-the-shore (LOTS) operations involve the loading or unloading of ships without the benefit of fixed port facilities, either in friendly or undefended territory or during wartime phases of theater development in which there is no enemy opposition. These operations may be conducted either from ship to shore or from shore to shore. They may be used to supplement or increase tonnage capabilities of existing terminals when regular operating procedures are disrupted by enemy action, to relieve congested lines of communications, or to reduce the land transportation required to support combat forces.

Equipment used in LOTS operations must be capable of handling break-bulk, containerized (dry and refrigerated), and liquid cargoes. Containerships that are not self-sustaining may have to be loaded or unloaded without the benefit of fixed port facilities. Representative methods may include the use of cranes mounted on DeLong-type piers, floating cranes, or mobile cranes placed on the ship's weather deck. Large break-bulk and container vessels may require a temporary discharge facility moored in deep water to facilitate the offloading of cargo into smaller, shallow-draft or amphibious craft. Similarly, large deep-draft tankers may require single-point mooring (SPM) systems and temporary petroleum discharge facilities to permit the large volume of product to be discharged efficiently. The establishment of offshore pumping facilities and shoreside tank farms to handle bulk petroleum products also could be required.

Principal vessel characteristics to be considered for LOTS operations include: (a) deck strength, (b) draft, (c) cargo gear, (d) cargo stowage capability, (e) open deck space, (f) crane mountability, and (g) maximum sea state in which the vessel can perform its functions effectively.

Amphibious Operations

Amphibious operations are attacks launched from the sea onto a hostile shore by naval and landing forces. The purposes include gaining a lodgment from which to carry out further combat operations ashore, securing an area for an advanced air or naval base, or denying the use of seized positions to the enemy. These operations include the movement of personnel, equipment, and supplies into the objective area and the actual amphibious assault on the hostile shore. Transportation to the objective area usually is accomplished with naval amphibious vessels, supplemented by commercial shipping assets. The assault is carried out with specialized landing craft and amphibious vehicles that carry the

assault troops. Specialized equipment also is required for assault follow-on echelons and for logistic resupply of the amphibious force.

Principal vessel characteristics to be considered for amphibious operations include: (a) cargo and personnel carrying capability, (b) physical discharge capability, and (c) draft.

Fleet Maintenance and Support

The objective of maintenance and support is to provide ships and watercraft with repair and maintenance services and utility support, such as electrical power, potable water, and refueling. Often, to meet an immediate requirement, floating barges are equipped with commercial or military maintenance and support equipment to fulfill a particular function. Waterborne maintenance and repair facilities also may be provided as necessary to forces operating ashore.

Principal vessel characteristics to be considered for fleet maintenance and support operations include: (a) bulk and liquid cargo storage capacity, (b) electrical generating capacity, (c) open deck area, (d) crane capability, and (e) accommodations.

Dredging

Dredging often is necessary to improve the capability of a port or waterway to handle vessels, military and commercial, needed to support military operations. If large commercial dredges are not available, the use of dredging equipment installed on barges may be required.

Principal vessel characteristics to be considered for dredging include: (a) type of dredge, (b) deployment (by towing or lifting), (c) draft, (d) deck space, (e) accommodations for the required personnel, and (f) capacity.

Towing

Towing assists in the movement of vessels and craft that are not self-propelled (principally, barges, floating structures such as DeLong piers, and disabled ships) in intra-theater shipping operations. Towing operations include the transport of heavy or outsized equipment by heavy-lift barges and tugs. Inland waterway movement of cargo and equipment by river or canal barges or by ship-transported (LASH or SeaBee) barges is included in "Overseas Inland Waterway Operations", above.

Principal vessel characteristics to be considered for towing operations include: (a) range and endurance, (b) bollard pull, (c) navigation equipment, and (d) free-running speed.

Salvage

Marine salvage operations are extremely varied. In general, their principal objectives are (a) to save vessels and cargo and (b) to move or remove wrecks and other obstructions. The former may involve rescue towing, refloating stranded vessels, or raising sunken vessels. The latter includes clearing sea approaches, channels, harbors, piers, and inland waterways of stranded or sunken ships or other obstructions. Salvage operations are not restricted to vessels. They often involve the retrieval or removal of aircraft, missiles, demolished bridges, pier pilings and footings, and a variety of other objects. The location of sunken or submerged objects may require the use of research vessels that have sonar bottom-profiling capabilities.

Principal vessel characteristics to be considered for host vessels used in salvage operations include: (a) draft, (b) power, (c) deck space, (d) towing capability, (e) auxiliary equipment (e.g., pumps, cranes, winches), (f) portable equipment (e.g., pumps, compressors, welders, consumables), and (g) free-running speed.

Search and Rescue (SAR)

The objective of search and rescue (SAR) operations is to minimize loss of life, injury, and property damage by aiding persons and vessels in distress in a marine environment, including inland waterways. Such operations vary from the quick recoveries that can be performed by any vessel in the immediate area to long searches involving special equipment and skills that only certain types of rescue vessels can provide. The principal responsibility for conducting SAR missions rests with the U.S. Coast Guard, although all readily available uniformed services normally cooperate in these operations.

To accomplish SAR missions, the Coast Guard owns and operates motor lifeboats, large utility boats, motor rescue boats, patrol boats, and Coast Guard cutters (CGCs). (In general, Coast Guard vessels under 19.81 m (65 ft) in length are termed "boats," while those of 19.81 m and over are termed "cutters." Confusion sometimes arises from the Coast Guard's use of the term "patrol boats" to describe its 25- and 29-m (82- and 95-ft) vessels. These are, in fact, included in the "cutter" category, along with the medium- and high-endurance cutters (MECs and HECs).)

Generally, SAR missions in harbors, bays, rivers, and along coasts involve motor lifeboats, utility boats, and motor rescue boats, while operations between 10 and 300 nautical miles (nmi) off the U.S. coast involve the SAR cutters and patrol boats. Normally, the patrol boats are employed within the 10- to 100-nmi zone and the CGCs (MECs and HECs) are employed within the 100- to 300-nmi zone, although there is considerable flexibility in their assignments.

Under current Coast Guard SAR plans, an SAR vessel operating within the 10- to 100-nmi zone of the U.S. coast must be capable of reaching the scene of distress within 12 hours, searching for 2 days at 12 knots, and returning to port with a tow. A second vessel of the same capability must be able to reach the scene within 18 hours.

An SAR vessel operating within the 100- to 300-nmi zone must be capable of reaching the scene of distress within 36 hours and searching for 7 days at 15 knots. A second cutter of the same capability must be able to reach the scene within 48 hours.

Principal vessel characteristics to be considered for SAR operations include: (a) speed, (b) range and endurance, (c) communications, (d) towing capability, (e) precision navigation equipment, and (f) search capability (radar, e.g.).

Aids-to-Navigation Support

The objectives of aids-to-navigation operations are (a) to assist maritime traffic in determining position and (b) to warn of dangers or obstructions, principally through the use of navigational references. These include audio, visual, and electronic signals, such as buoys or lights. The U.S. Coast Guard uses several types of support craft to establish and maintain these aids to navigation.

High-speed, light-weight, and extremely maneuverable boats are used by the Coast Guard's Aids to Navigation Teams in sheltered waters to inspect and repair fixed structures and buoys. Their shallow draft makes them well-suited for working in areas around shoals, bars, and marshes. These open boats are used for fair-weather operations during daylight. To reach remote launch sites, each boat is provided with a trailer that can be towed over highways. This feature greatly expands the operating range of the Aids to Navigations Teams.

Servicing the large buoys used in exposed waters offshore requires offshore buoy tenders. These must have a cruising speed of 15 knots, an endurance of 30 days, and a 15-ton lifting capacity.

Inshore buoy tenders operate in harbors and harbor entrances to service medium-sized buoys. They must have the capability to transit exposed waters enroute to work areas, endurance of 10 to 20 days, and a 5-ton lifting capacity.

Inshore construction tenders operate in sheltered waters with work barges, which have the capability of driving piles and placing spuds on the bottom to secure themselves in position while working. These shallow-draft vessels must have the capability to transit exposed waters as necessary to reach their work areas and an endurance of 10 to 20 days.

River tenders operate on inland rivers and must have a large storage area for many small buoys, shallow draft, a 2-ton lifting capacity, and an endurance of 10 to 20 days.

Lightships are anchored offshore as aids to navigation that warn mariners of danger or mark the terminus of trans-ocean shipping routes. They must be seaworthy and have the capacity to remain on station for extended periods.

Each of the above-mentioned vessels must have a large, stable working area on deck for servicing aids to navigation and for equipment storage.

Principal vessel characteristics to be considered for aids-to-navigation support include: (a) endurance, (b) lifting capability, (c)

TABLE 4-2 Coast Guard Icebreaker Classes and Capabilities

Cutter Class	Classification	Ice Category a/	Icebreaking Capability (Ice Thickness - Ft) Continuous	Running
POLAR SEA, POLAR STAR	Icebreaker (WAGB)	P	6.0	21.0
GLACIER	Icebreaker (WAGB)	A	3.7	14.5
NORTHWIND, WESTWIND	Icebreaker (WAGB)	A	3.2	11.0
MACKINAW	Icebreaker (WAGB)	B	2.7	9.0
KATMAI BAY	Icebreaking Tug (WTGB)	C	1.6	5.5
	Buoy Tender, 180-Ft (WLB)	D	1.4	4.0
	Buoy Tender, 133- to 177-Ft (WLM)	D	1.4	4.0
	Harbor Tug, 110-Ft (WYTM)	D	1.4	4.0
	Harbor Tug, 65-Ft (WYTL)	E	1.0	-

a/ Each vessel class is assigned to one of six ice categories, which are defined in terms of the maximum thickness of clear blue ice that can be broken in continuous running:

P	4.1 ft or more
A	3.1 to 4.0 ft
B	2.1 to 3.0 ft
C	1.6 to 2.0 ft
D	1.1 to 1.5 ft
E	0.5 to 1.0 ft

adequate deck space, (d) shallow draft, and (e) precision navigation equipment and depth finder.

Ice Operations

The objective of ice operations is to facilitate maritime transportation and other activities in the national interest in ice-laden domestic and polar waters. The services provided in ice operations also assist in furthering marine safety and environmental protection.

The operations include (a) search and rescue, (b) aids to navigation, (c) escort of shipping, (d) direct logistic support to manned outposts, (e) military readiness, and (f) support to polar scientific research sponsored by the Coast Guard, DOD, National Science Foundation, and other federal and private agencies.

Polar ice-breaking operations are conducted in both the Arctic and Antarctic regions. The Coast Guard owns and operates the only U.S. icebreakers that are capable of operating in polar regions, except for certain ice-breaking barges.

Domestic ice-breaking operations are conducted in several U.S. inland and coastal regions: on the East Coast from Maine to the Chesapeake Bay, throughout the Great Lakes, on the Upper Mississippi River system, and in Alaskan waterways. In the non-polar regions, the purposes served by Coast Guard domestic ice-breaking vessels include

promoting safety and saving lives and property, assisting regions imperiled by floods, and meeting the reasonable demands of commerce.

The Coast Guard cutters used for ice-breaking operations comprise a variety of classes and capabilities. Icebreakers have generally been classified according to their geographical area of employment rather than their capabilities. Thus, there are polar icebreakers and several types of domestic icebreakers and ice-breaking vessels. The approximate ice-breaking capabilities of each Coast Guard cutter class are shown in Table 4-2.

Principal vessel characteristics to be considered for ice-breaking operations include: (a) ice strengthening, (b) adequate horsepower, (c) endurance, and (d) communications.

NOTES

1. Department of Transportation, "Emergency Procedures for Civil Transportation," DOT Standby Order 1940.1A, May 17, 1972.
2. Current priorities for utilization of merchant ships were established by the "Wilson-Weeks Agreement." See "Memorandum of Agreement Between the Department of Defense and the Department of Commerce, Dealing with the Utilization, Transfer and Allocation of Merchant Ships - 1 July 1954," signed by Secretary of Defense Charles E. Wilson and Secretary of Commerce Sinclair Weeks; implemented by DOD Instruction No. 5030.3, signed by T.P. Pike, Assistant Secretary of Defense (Supply & Logistics), Oct. 20, 1954.
3. 10 U.S.C. 2303 et seq.
4. 10 U.S.C. 2304(a).
5. See (a) Federal Preparedness Agency, Federal Preparedness Circular 6 (FPC 6), "Designation of Federal Claimant Agencies for Emergency Preparedness Planning," Apr. 11, 1977; and (b) Office of Emergency Planning, Circular 8500.5 (OEP 8500.5), "General Guidance for Resource Management in National Emergencies," Aug. 12, 1966. Issued by the Federal Preparedness Agency's predecessor, OEP 8500.5 will be superseded by FPC 7 (which bears the same title) when the latter is approved.

   In 1968, the Office of Emergency Planning was renamed the Office of Emergency Preparedness (OEP). Under Reorganization Plan No. 1 of 1973, President Nixon abolished the OEP and, by Executive Order 11725 (June 27, 1973), he transferred most of its functions to the General Services Administration (GSA). By administrative order issued by GSA's Administrator on June 26, 1975, the Federal Preparedness Agency (FPA) was established as a subordinate agency within GSA. Reorganization Plan No. 3 of 1978 created the Federal Emergency Management Agency (FEMA), of which FPA became an integral part. Like its predecessors (except, as noted above, during 1973-1975), FEMA will be an independent agency in the Executive Branch.
6. Two principal statutory enactments upon which civil emergency preparedness activities are based are Sec. 103 of the National Security Act of 1947, 50 U.S.C. 404 (P.L. 80-253), and the Defense Production Act of 1950, as amended, 50 U.S.C. App. 2061 et seq.
7. 46 U.S.C. 1242(a).

8. Sec. 902(a), Merchant Marine Act, 1936, as amended; 46 U.S.C. 1242(a). Generally dispersed throughout Title 46 U.S.C.
9. Sec. 902(c), Merchant Marine Act, 1936; 46 U.S.C. 1242(c).
10. Joint Chiefs of Staff, Mobility System Policies, Procedures, and Considerations, JCS Publication 15, June 2, 1975.
11. The NSA has continuing legal existence in peacetime and would be brought into full operation when the decision was made to requisition ships.
12. 46 C.F.R. 308.
13. This authority is contained in the Merchant Marine Act of 1936 and the Defense Production Act of 1950, and related Executive Orders and Regulations.
14. Executive Order 11051, "Prescribing Responsibilities of OEP" (Sept. 27, 1962) and Executive Order 11490 (Oct. 28, 1969), as amended.
15. Under FPC 6 (note 5, supra), the Department of Commerce (Maritime Administration) is the Federal Resource Agency for oceanborne transportation services (foreign, domestic, and Great Lakes-St. Lawrence Seaway) and related lighterage, towing, tugboat, marine cargo handling facilities, and water transportation services, except such facilities and services as are organic to or controlled by the military activities of the Department of Defense or elsewhere assigned for management by the Department of Transportation.

III

COMMERCIAL VESSELS AND CRAFT

5

INTRODUCTION

Chapters 6 through 9 describe 17 private maritime industry sectors and the vessels in each sector's fleet. They were selected for inclusion based on their potential defense utility and the availability of data to the study committee. Of these, five are segments of the fishing industry. The majority of vessels in two sectors, oceanographic research vessels and private motor yachts, are not engaged in commercial activities. Two important specialized commercial sectors, advanced marine vehicles--air cushion vehicles (ACVs), surface effect ships (SESs), and hydrofoils--and marine salvage vessels, are not represented by significant numbers of commercial vessels under U.S. flag.

A list of the sectors follows:

<u>Chapter 6</u>

1) Ocean-Classed Tugs
2) Ocean-Classed Barges
3) Crane and Derrick Barges

<u>Chapter 7</u>

4) Offshore Service and Supply Vessels
5) Drillships and Semisubmersibles

TABLE 5-1 Relative Capabilities of Vessel Types

Vessel Capabilities[b] / Vessel Types[a]	Ocean-Classed Tugs	Ocean-Classed Barges	Crane and Derrick Barges	Offshore Service and Supply	Drillships and Semisubmersibles	Fishing: Tuna	Fishing: Menhaden	Fishing: King Crab	Fishing: Trawler and Groundfishing	Fishing: Shrimp	Oceanographic Research	Dredges	Floating Drydocks	Motor Yachts	Ferries	Marine Salvage Vessels	ACVs, SESs, and Hydrofoils[c]
A. *General Service Particulars*																	
2. Length, Beam, Depth, Draft, Overall Height Above Water	2	2	1	2	2	2		2	2	2	1	1	2	1	1	1	1
3. Propulsion Type, Total Horsepower, Fuel Requirement	2	2		2	1	1	1	1	1	1	1			1		2	
4. Cruising/Maximum Speeds	1	1		2	1	1					1			2		2	2
5. Endurance	2	2		2	2	1			1	1	2			1		1	
6. Required Crew Complement, Total Accommodations				2	2	1				1	2			2	1		2
7. Maximum Sea State	2	2		2	2	1		1	1	1	2			1		2	
8. Vessel Maneuverability	1	1		1	1			1			1			1	1	2	1
9. Cargo Capacity (on deck/below deck; dry/liquid)		2	2	2	2	2	1					1			2		
10. Dry Stores Capacity		2		1	2		2	2	2		1			1			
11. Reefer Capacity		2		1	2		2	2	2		1			1			
12. Clear Cargo Area (on deck/below deck)		2	2	2	2	2							2		2		
13. Average Deck Strength		1	2	2	2					1			2		1	2	
14. Cargo or Materials Handling Capacity	1	2	2	2	2					1			2			2	
15. Navigation and Communications Equipment Installed	1			2	2	2	2	2	2	2	2			1		1	2
16. Year Built, Hull Material	1	1		1	2	1											
17. Classification Society Status						2	1	2	1	1							
18. Fresh Water Making and Washdown Capability	2			2							1	1				1	
19. External Firefighting Capability	1			1	1							1				2	
20. Tow Winch, Bollard Pull	2			2				1	1	1	1					2	

21. Helipad		2		1	2	1										1	
22. Ice Strengthening	1	1			1												
B. *Vessel Adaptability*																	
24. Convertibility of Tanks for Fuel or Other Liquids		2		2	2	1	1	1	1	1	1						
25. Additional Passenger Berths		2		2		1	1				1			1	2		2
26. Container Capacity		2	2	1	2								2				
27. Maintenance and Repair Facilities		1	2					1	1	1			2			1	
29. Portable Crane Mountable		2		2												1	
30. Underway Replenishment	1	1		1		1				1	1		1				
C. *Barge Characteristics Only*																	
32. Configuration of Bow		2	1									1				1	
33. Compartmentation Below Deck		1	1									1				1	
34. Type of Skegs		1	1									1				1	
D. *Derrick/Crane Barge Characteristics Only*																	
36. Capacity in Each Mode			2														
E. *Dredge Characteristics Only*																	
37. Capacity of Main Equipment												2					

<u>Coding</u> <u>Capability</u>

2 = Notable
1 = Moderate
(blank) = Very Limited or None

[a]Vessel types are listed in same sequence as their treatment in text (Chapters 6 through 9).
[b]Numbering system corresponds to that used on the Vessel Characteristics forms included in Appendix A. Line 1 ("Normal Service Functions"), Line 23 ("Other Unusual Features," e.g., ramps or sideports), and Line 28 ("Special Cargo Carriage"), which appear in the Vessel Characteristics forms, are omitted here because their information content is too diverse to be generalized in this table.
[c]Air cushion vehicles (ACVs) and surface effect ships (SESs).

Chapter 8

6) Tuna Boats
7) Menhaden Vessels
8) King Crab Vessels
9) Trawlers and Groundfishing Vessels
10) Shrimp Boats

Chapter 9

11) Oceanographic Research Vessels
12) Dredges
13) Floating Drydocks
14) Motor Yachts
15) Passenger-Vehicle Ferries
16) Marine Salvage Vessels
17) Air Cushion Vehicles, Surface Effects Ships, and Hydrofoils

Table 5-1 gives an overview of the relative capabilities (notable characteristics) of these vessel types. The 17 industry sectors are listed as the column headings. The 37 vessel characteristics shown as the row headings are those that appear in the Vessel Characteristics forms (Appendix A). More complete definitions of these characteristics are included in Appendix A. In Table 5-1, the code "2" indicates a particularly notable or distinguishing feature; the code "1" indicates that the feature is less distinguishing or is present on only a limited number of vessels in that sector. A dash (-) means that the characteristic is never or rarely present.

6

TUGS AND BARGES

More than 6,800 commercial tugs and more than 23,000 commercial barges of U.S.-flag registry are included in the data files of the U.S. Coast Guard, the U.S. Army Corps of Engineers, and the American Bureau of Shipping. About 45 percent of these vessels are classed and certified for inland and river use. The remaining 55 percent are designed for and dedicated to ocean, coastal, and harbor work.

This chapter reviews the larger, ocean-classed, tugs and barges, which represent about 3 percent of the total U.S.-flag tug and barge fleet. Data are presented on ocean-classed tugs of 2,237 kW (3,000 brake horsepower) or more, and on ocean-clased barges of 2,000 gross register tons (grt) or more. Information on integrated tug-barge (ITB) systems is included under the discussion of tugs. The discussion of barges is divided into two sections: transport barges, including ice-breaking barges, and special-purpose barges. The latter section includes brief descriptions of pipe-laying, pipe-burying, and power-generating barges. Drilling barges have been excluded because of their lack of utility for the military functions of interest. Finally, crane and derrick barges are described.

OCEAN-CLASSED TUGS

Industry Description

Tugs are used with barges to transport cargo. Tugs also are used independently for ship docking, towing, salvage, and anchor handling. Tugs can operate at undeveloped beaches and harbors, as well as in developed seaports.

In fall 1978, the U.S. Coast Guard (USCG) Merchant Vessel Data Bank listed 6,831 U.S.-flag tugs owned by more than 1,000 companies. The tugs are classified by brake horsepower (bhp) and region in Tables 6-1

and 6-2. Great Lakes and inland river tugs, and tugs of less than 373 kW (500 bhp) are excluded from these tables.

For the purposes of this report, use of the USCG Data Bank information has been limited to tugs that meet the following five criteria:

(1) 2,237 kW (3,000 bhp) or more,
(2) Classed for ocean service,
(3) Less than 10 years old,
(4) Name and address of owner available in the USCG Data Bank, and
(5) Owned or operated within a fleet of at least 5 tugs that meet criteria (1) through (4).

While the Coast Guard provides a very complete listing of U.S. vessels, there is evidence that files are not updated promptly for

TABLE 6-1 Numbers of U.S.-Flag Ocean-Classed Tugs Based in the Continental United States by Horsepower and Region of Home Port

	Region of Home Port of Registry			
Brake Horsepower a/	East Coast	Gulf Coast	West Coast	Totals
500-999	302	415	119	836
1,000-1,999	457	241	163	861
Subtotals, below 2,000 bhp	759	656	282	1,697
2,000-2,999	85	68	51	204
3,000-3,999	71	73	33	177
4,000-4,999	48	42	6	96
Subtotals, 2,000-4,999 bhp	204	183	90	477
5,000-5,999	38	21	3	62
6,000-6,999	8	1	-	9
7,000-7,999	2	15	7	24
Subtotals, 5,000-7,999 bhp	48	37	10	95
8,000-8,999	10	10	-	20
9,000-9,999	1	-	23	24
10,000-10,999	1	-	-	1
11,000-11,999 (ITB) b/	2	-	-	2
14,000-14,999 (ITB) b/	2	-	1	3
15,000-15,999 (ITB) b/	1	-	-	1
Subtotals, 8,000-17,000 bhp	17	10	24	51
Totals, 500-17,000 bhp	1,028	886	406	2,320

a/ Excludes (a) Great Lakes and inland rivers tugs and (b) all tugs of less than 500 brake horsepower (bhp).

b/ All tugs in this bhp range are used in integrated tug-barge (ITB) systems.

TABLE 6-2 Numbers of U.S.-Flag Ocean-Classed Tugs Based Outside the Continental United States by Horsepower and Region of Home Port[a]

	Region of Home Port of Registry				
Brake Horsepower [a]	Hawaiian Islands	Virgin Islands	Puerto Rico	Guam	Totals
500-1,000	8	1	3	5	17
1,000-1,999	8	3	9	2	22
2,000-2,999	7	-	-	-	7
3,000-3,999	2	-	-	-	2
4,000-4,999	1	-	-	-	1
Totals	26	4	12	7	49

[a] Excludes all tugs of less than 500 brake horsepower (bhp).

vessels, nor are all the listed horsepower figures correct. For some tugs, indicated horsepower is shown; for others, brake horsepower is listed. Also, in many cases, the owner is listed as a financial institution and the identity of the operator is not available. Finally, the USCG Data Bank does not distinguish between units classed for ocean service and those classed for inland waterway use. Tugs of 2,237 kW (3,000 bhp) or more are usually capable of ocean service; however, many tugs in inland waterways service exceed this power rating, but are not classed for ocean service.

Of the 422 tugs surveyed for this report, a total of 138 met the established criteria. About 65 percent of these are used in the oil industry. The remainder are employed in the commercial carriage of cargo in the U.S. coastal (coastwise and intercoastal) trades; the non-contiguous trades (i.e., between the continental United States and such non-contiguous states, territories, and possessions as Alaska, Hawaii, Guam, Wake, Puerto Rico, and the Virgin Islands); and the inter-island trades (e.g., among the Hawaiian Islands or among Puerto Rico, the Virgin Islands, and other Caribbean Islands). Table 6-3 provides a breakdown of the number of tugs by horsepower for each owner-operator identified.

In ITB systems, the tug is designed to lock into the barge, forming a rigid connection. At present, fewer than 12 of these systems are in service in the United States. Most are tank barges or bulk carriers drawing 7.6 m (25 ft) of water or more. The ITB tugs spend most of their time locked into their barges and most perform poorly when operating without the barge.

To date, ITB systems have been used to transport bulk commodities such as petroleum, iron ore, and coal. Owner-operators of from 1 to 4 ITBs each include: Coordinated Caribbean Transport; Ingram Ocean Systems, Inc.; and SeaBulk Corporation, Inc.

There are indications that the number of ITBs may increase. Avondale Shipyards, Inc., is building 3 ITB systems of 40,100 metric tons (39,500 long tons) deadweight, using catamaran tugs (CATUGs)

TABLE 6-3 Numbers of U.S.-Flag Ocean-Classed Tugs of 3,000 or More Horsepower and Built Since 1968, by Owner-Operator and Horsepower

	Brake Horsepower				
Owner-Operator	3,000 to 3,999	4,000 to 4,999	5,000 to 6,999	7,000 to 9,000	Totals
Crowley Maritime Corp.	3	-	5	25	33
Nolty J. Theriot, Inc.	1	4	6	6	17
Gulf Mississippi Marine Corp.	4	3	2	3	12
Jackson Marine Corp.	6	2	-	4	12
Interstate Towing Co.	5	1	5	-	11
F & S Offshore Fleet	5	-	-	5	10
McAllister Brothers, Inc.	6	3	-	-	9
Moran Towing Co.	5	4	-	-	9
Otto Candies, Inc.	4	3	-	-	7
Robin Towing Co.	2	4	-	-	6
Foss Launch and Tug Co.	5	-	-	-	5
DeFelice Marine Construction Co.	2	2	-	-	4
American Offshore Fleet, Inc.	-	3	-	-	[illegible]
Totals	48	29	18	43	138

designed to interlock with the notched sterns of the barges. Among the advantages of this system are wide separation between the propellers and an improved turning radius.

Tugs and barges that operate as common carriers or contract carriers of cargo generally derive their revenues from freight charged on the basis of the quantities and types of cargoes carried, rather than from charter hire per day or per voyage. Tugs used in the offshore oil industry operate almost exclusively on a charter basis. Most owner-operators of the latter have home offices on the Gulf of Mexico. Charter rates fluctuate with supply and demand. In late 1978, charter rates for tugs used for services related to offshore oil exploration ranged from $2,800 to $3,900 per day, without fuel, depending on the capabilities of the tug and the tasks performed. Often, the duration of the charter also influences the daily rate, with longer charters generally billed at lower rates than the short-term or spot charters.

Vessel Availability

Ownership of the 142 tugs of 2,237 kW (3,000 bhp) or more identified in this report rests with 13 companies. Almost a third of these companies also operate ocean-classed barges that meet the criteria of this study (see "Ocean-Classed Barges", below). Information on areas of operation was obtained for 63 of the 142 tugs selected for analysis. Table 6-4

shows the geographic distribution of these tugs, which operate off the continental United States, by owner-operator.

Owner-operators of tugs used to support the oil industry normally have overseas operating bases in addition to domestic bases. At present, tug fleets are based in such areas as the North Sea, Africa, the Middle East, Singapore, the Far East, and Brazil. The locations and size of staff at overseas locations vary with changing needs.

Major owner-operators with tugs in overseas locations are generally those that follow the offshore oil service industry. Areas of offshore oil exploration are shown on the world map in Figure 7-1 (Chapter 7).

The remaining owner-operators listed in Table 6-4 provide common or contract carrier service in the coastal, non-contiguous, or inter-island trades. Owner-operators with fewer than 5 tugs meeting the other above-listed criteria can be identified through a search of the USCG Data Bank.

Owner-operators of tugs used in support of oil exploration are capable of furnishing logistic support on short notice in such areas as engineering, crewing, and operational management from their network of U.S.-based and overseas facilities. Each owner-operator with fleets operating in such overseas areas as the North Sea, Singapore, or the Middle East is known to have inventories of spare parts in those areas commensurate with the number of vessels in operation. Owner-operators of tugs engaged in coastal, non-contiguous, or inter-island cargo carriage usually maintain spare parts inventories in their home ports.

TABLE 6-4 Numbers and Geographic Distribution of U.S.-Flag Ocean-Classed Tugs Operated Off the Continental United States as of December 1978: Selected Operators

	Area of Operation			
Owner-Operator	East Coast	West Coast	Gulf Coast	Total
Crowley Maritime Corp.	-	13	10	23
Interstate Towing Co.	10	-	-	10
Moran Towing Co.	9	-	-	9
Foss Launch and Tug Co.	-	7	-	7
McAllister Brothers, Inc.	(6)[a]	-	(6)[a]	6
Gulf Mississippi Marine Corp.	-	4	-	4
Otto Candies, Inc.	-	-	2	2
Jackson Marine Corp.	-	1	-	1
Robin Towing Co.	-	-	1	1
Totals	(25)[b]	25	(19)[b]	63

[a] All 6 McAllister tugs are listed as operating on both East and Gulf Coasts.

[b] Includes 6 McAllister tugs that operate on both East and Gulf Coasts.

In the last quarter of 1978, there was a surplus of available oceangoing tugs. Thus, in such a surplus situation, government acquisition of a portion of U.S.-flag tugs probably would not adversely affect the established commercial sector. If a large portion of the tug fleet were to be requisitioned, seasonal variations in vessel employment due to climate and weather (e.g., Arctic ice conditions, or the heavy winter seas that limit North Sea oil exploration operations to a 6-month season) and changes in the geographic distribution of the vessels due to shifts in the areas of concentrated oil exploration efforts would play major roles in determining the impact on the private sector. For example, the North Sea and North Slope oil exploration operations have generated increasing needs for tug support. A substantial number of foreign-owned and -operated tugs are now available for the North Sea energy development. Consequently, unused U.S.-owned tugs may be available. The individual owner-operator is in the best position to advise about availability.

The military used a considerable number of commercial oceangoing tugs in support of naval operations during World War II.

Manning Considerations

Time at sea for tugs of 2,237 kW (3,000 bhp) or more varies with the assigned task. For example, most oceangoing tugs have the seaworthiness and fuel capacity to operate trans-Atlantic or trans-Pacific with an intermediate fuel stop at the Azores, Hawaii, or Dutch Harbor. If they were to proceed light (i.e., without tows), most could cross the ocean without refueling. However, these tugs are not designed for continuous trans-ocean work. The preferred trips are of 2,000 to 2,500 nmi and of 10 to 20 days duration.

Each company establishes its own manning periods. Tugs on anchor-handling assignments in foreign waters average 30 to 45 days on the job without change of crews. In rare cases, ocean crossings have extended from 45 to 60 days.

For normal towing assignments, the crew usually consists of 8 men: the Master, 2 Mates, a Machinery Supervisor (generally called the Chief Engineer on inspected vessels), a Cook, 2 Able Bodied Seamen (ABs), and an Ordinary Seaman. The Master should have no less than 3 years' experience in ship handling or towing. Typically, Masters are former Mates or ex-military Deckhands or Quartermasters. Prevailing industry opinion holds that the best tugboat Masters are those who started young or on small craft where shipwork in close quarters is routine. Former Masters of large vessels seldom become top Masters of tugs--probably by choice.

Those U.S.-flag tugs operating at overseas locations are required by law to have Masters who hold valid Master's or Operator's licenses issued by the Coast Guard. To qualify for such a license, the applicant must be a U.S. citizen in addition to meeting experience and academic requirements.

Mates stand navigational bridge watches and perform routine ship duties. Typically, they are in training for Masters' assignments. If

given sufficient training in piloting and navigation, new personnel may qualify as Mates after a few trips.

The Machinery Supervisor (or Chief Engineer) may become qualified in the maintenance of the particular machinery plant through experience or schooling. New personnel always serve as assistants to the Machinery Supervisor during a break-in period of several trips. Many Machinery Supervisors acquire early engineering training on other types of commercial vessels or on military vessels.

Deckhands (Seamen) can acquire the necessary experience after a few trips. The criteria for qualification as an AB are based upon experience (sea time) and on a formal examination.

On tugs operating overseas, crew members, other than the Master, may be foreign nationals. This has proven beneficial because crew members with local knowledge and multi-language skills contribute to a safer operation. Within two to three days, most operators could replace any foreign crew members aboard vessels operating in foreign waters with U.S. citizens holding valid Coast Guard documents.

In general, U.S. tug owner-operators that are primarily associated with offshore oil exploration and development are not union-affiliated. Most have their headquarters on the U.S. Gulf Coast. Those tug-barge operators that have common carrier, contract carrier, or charter operations outside the oil industry normally have agreements with one or more of the seafaring unions.

During peacetime, most owner-operators can man their tugs from their pool of experienced and qualified personnel. During conflicts of the magnitude of Vietnam or Korea, the owner-operators still have had ample crews to man the tugs. Although living, messing, and berthing space aboard tugs is limited, most can accommodate 2 or 3 additional personnel.

Vessel Description

Oceangoing tugs vary in length from about 27 to 46 m (90 to 150 ft), depending on their horsepower and primary mission. Power generally varies between 2,250 and 7,460 kW (3,000 and 10,000 bhp). Most tugs exceeding 7,460 kW are part of specialized ITB systems. Uninspected tugs normally operate with 8-man crews. Inspected tugs of 300 grt or more operate with crews of 10 to 12, and ITBs typically operate with crews of 13 to 15.

Most tugs that are designed and built for use in oil exploration are fitted with double-drum towing winches and are capable of setting, lifting, and moving the 15- to 30-ton anchors of drill rigs. Anchors are lifted by the towing winch, which is powered by a diesel engine through a torque converter. Some tugs are equipped with hydraulically driven towing engines.

The majority of U.S.-flag oceangoing tugs, however, are less than 300 grt. This allows them to be classed as uninspected towing vessels. Whether or not the vessels are Coast Guard-inspected, all are built to specifications and plans approved by the American Bureau of Shipping (ABS) or one of the other recognized national classification societies.

Most uninspected tugs are equipped with automated engine rooms. One or two engineering personnel are able to monitor and service the plant as necessary. Tugboat engines of U.S. manufacture generally are marine versions of proven railroad engines.

Most oceangoing tugs are equipped with double-drum towing winches and towing wire of 50- to 60-mm (2- to 2.25-in.) diameter with wire lengths from 700 to 915 m (2,300 to 3,000 ft).

While all are classified as tugs, their towing success depends largely on the quality of the towing gear (i.e., the winches, wires, towing rails, and hold-down gear for the towing wire). Many tugs are fitted with Kort nozzles. Few U.S. tugs have bow thrusters, since these tugs are short and highly maneuverable. A few have derricks or booms of limited lift capacity for loading stores, supplies, and spare parts.

In addition, most ocean tugs carry the following standard navigation and communications equipment:

- Single sideband (SSB) radio
- VHF radios
- Gyro compass
- Radio direction finder (RDF)
- LORAN A or C (depending on area)
- Radar

Those tugs operating in conjunction with offshore oil exploration in Europe and parts of the Middle East also carry:

- AM/FM radio transmitter-receiver
- Decca Navigator

The SSB radios, carried on all tugs engaged in trans-ocean service, and the relay services from domestic and overseas transmitters have been adequate for most operators. Many governments prohibit private shore-based transmitters and receivers, restricting those services to their own national telecommunications systems.

OCEAN-CLASSED BARGES

Industry Description

Oceangoing tugs and barges offer extremely versatile methods of ocean transport. Barges are used to transport a wide variety of cargoes, including bulk liquids, dry bulk, heavy equipment, machinery, drill rigs, and vehicles.

Unlike most ships, barges can serve undeveloped beaches and harbors, and operate in shallow waters. Flat-bottomed barges have been used successfully in tidal areas where they can rest on the bottom without damage. Barges also can be submerged for loading or unloading heavy floating equipment--such as small tugs, small barges, harbor craft, dredges, DeLong piers, hovercraft, and amphibious vehicles--in areas where heavy-lift facilities are not available.

There are six general categories of ocean transport barges: (a) deck cargo barges; (b) covered deck or house barges; (c) roll-on, roll-off (Ro/Ro) barges; (d) rail barges; (e) container barges; and (f) tank barges. Covered deck or house barges are used to transport packaged dry cargo or moisture-sensitive cargo. Ro/Ro barges are used to transport truck trailers and vehicles, and rail barges are used to carry rail cars. Most deck cargo barges can transport containerized cargo, stacked several tiers high. Tank barges have been tailored to transport almost any bulk liquid product from petroleum to edible oils to dangerous chemicals.

The low construction and maintenance costs characteristic of barges have led to the development of specialized types. These include power-generating barges (Consolidated Edison Company of New York), submersible barges, fabrication barges, dredging barges, pulp platform barges, lumber carriers, refrigerated barges, and manned barges of various types. In addition, one U.S.-flag barge on the West Coast has ice-breaking capability. It is used to resupply the DEW Line stations of the Arctic and the North Slope oil fields.

The USCG Data Bank currently lists 23,164 U.S.-flag barges. This total encompasses all barges, from small dump scows to the largest specialized ITB systems. It includes oil exploration barges and the ancillary smaller barges used in that industry, as well as some 4,500 tank barges. A substantial number of registered U.S.-flag barges (10,179) are classed as inland vessels and are used on the Western Rivers System (which includes not only the Mississippi and its tributaries but also the Columbia, Sacramento, and other rivers of the far west). The inland fleet consists of hopper barges (for coal, sand, or gravel), grain barges, petroleum barges, and deck cargo barges. Under Coast Guard regulations, vessels classed for "inland service only" cannot be operated in ocean service.

Table 6-5 shows the geographic distribution of ocean-classed U.S.-flag barges. The inland fleet is excluded from this table, as are barges designed for carriage aboard oceangoing vessels (LASH and SeaBee barges), and all barges under 1,000 grt.

The following brief analysis of the USCG Data Bank information (summarized in Tables 6-6 through 6-9) has been limited to barges that meet the following four criteria:

(1) 2,000 or more grt,
(2) Classed for ocean service,
(3) Name and address of owner available in the USCG Data Bank, and
(4) Owned or operated within a fleet of at least 5 barges of any type that meet criteria (1) through (3).

The data limitations noted in the section on "Ocean-Classed Tugs" apply to this analysis as well.

A total of 585 barges of 2,000 or more grt were surveyed for this report. Of these, 238 transport barges were found to meet criteria (2) through (4). Ownership of these 238 barges (72 tank barges and 166 general transport barges) rests with 18 companies. Almost a third of these companies operate both dry cargo and tank barges. There are 5 major owner-operators of drilling platform barges, several of whom

TABLE 6-5 Numbers of U.S.-Flag Ocean-Classed Barges by Gross Tonnage and Region of Home Port[a]

	Region of Home Port of Registry					
Gross Register Tonnage (grt)	East Coast	Gulf Coast	West Coast	Hawaiian Islands	Puerto Rico	Totals
1,000-1,999	1,198	397	133	7	3	1,738
2,000-2,999	112	50	83	4	2	251
3,000-3,999	46	34	29	3	1	113
4,000-4,999	17	29	17	-	-	63
5,000-5,999	14	14	11	-	-	39
6,000-6,999	14	5	15	-	-	34
7,000-7,999	8	12	2	-	-	22
8,000-8,999	9	8	7	-	-	24
9,000-9,999	7	3	1	-	-	11
10,000-10,999	5	2	2	-	-	9
11,000-11,999	3	2	2	-	-	7
14,000-14,999	6	-	-	-	-	6
16,000-17,999	1	2	-	-	-	3
18,000-19,999	1	-	1	-	-	2
20,000 and over	-	-	1	-	-	1
Totals	1,441	558	304	14	6	2,323

a/ Excludes Great Lakes and river barges, LASH and SeaBee barges, and all barges under 1,000 grt.

operate transport barges as well as offshore service and supply vessels. The 2 major owner-operators of other specialty oil exploration barges (e.g., pipe-laying and pipe-burying barges) also own a number of derrick barges.

The information in this section is based on data on 245 barges: the 238 transport barges, 6 power-generating barges, and the 1 ice-breaking barge. About 30 percent of the barges identified are tank barges used exclusively in the petroleum or liquid chemical trades. The remaining 70 percent comprise deck cargo barges, Ro/Ro barges, covered house barges, rail barges, and other specialized barges. Some are multi-qualified to carry both deck cargo and covered cargo, or both deck cargo and petroleum products.

Table 6-6 shows the number of tank barges by grt for each owner-operator identified. Table 6-7 shows the same information for the general transport barges.

Owner-operators of barges used in common or contract carriage generally derive their income from freight charged for cargoes transported. Barges used in the offshore industry operate almost exclusively on the basis of charter. Charters are negotiated, either directly with the customer or through a chartering agent. In 1976, a 91.44-m by 27.43-m (300-ft by 90-ft) deck cargo barge could be chartered for $2,000 to $3,000 per day, with longer charters receiving more favorable per diem rates. However, since 1976, the excess of available barges and the offshore industry recession have driven rates even lower.

TABLE 6-6 Numbers of Ocean-Classed Tank Barges by Owner-Operator and Gross Tonnage

Owner-Operator	Gross Register Tonnage (grt) 2,000 to 3,999	4,000 to 5,999	6,000 to 7,999	8,000 to 9,999	10,000 to 11,999	12,000 and Over	Totals
Crowley Maritime Corp.	17	7	1	5	-	-	30
Moran Towing and Transportation, Inc. (including affiliated companies)	8	1	-	-	-	-	9
Interstate and Ocean Transporation Co.	2	-	2	-	-	4	8
Allied Towing Corp.	5	1	-	-	-	-	6
Bouchard Transportation Co.	3	2	-	-	-	-	5
Steuart Transportation Co.	5	-	-	-	-	-	5
Texaco, Inc.	3	1	-	-	1	-	5
Bulk Food Carriers, Inc.	1	-	-	-	-	-	1
Sheridan Transportation Co.	-	1	-	-	-	-	1
Tidewater Barge Lines	1	-	-	-	-	-	1
Zidell, Inc.	1	-	-	-	-	-	1
Totals	46	13	3	5	1	4	72

TABLE 6-7 Numbers of Ocean-Classed General Transport Barges by Owner-Operator and Gross Tonnage

Owner-Operator	Gross Register Tonnage (grt) 2,000 to 3,999	4,000 to 5,999	6,000 to 7,999	8,000 to 9,999	10,000 to 11,999	12,000 and Over	Totals
Crowley Maritime Corp.	26	15	16	1	2	2	62
J. Ray McDermott, Inc.	24	1	-	-	-	1	26
Foss Launch and Tug Co.	20	1	-	-	-	-	21
Brown & Root, Inc.	9	-	-	1	-	-	10
Bulk Food Carriers, Inc.	5	2	-	2	-	1	10
Otto Candies, Inc.	8	-	-	-	-	-	8
Reading & Bates Exploration Co.	4	3	-	-	-	-	7
Zidell, Inc.	6	-	-	-	-	-	6
Gulf Mississippi Marine Corp.	2	3	-	-	-	-	5
Sheridan Transportation Co.	-	-	4	-	-	-	4
Tidewater Barge Lines	4	-	-	-	-	-	4
Santa Fe-Pomeroy Marine Service	3	-	-	-	-	-	3
Totals	111	25	20	4	2	4	166

Vessel Availability

Information on principal areas of normal operation was obtained for 53 of the tank barges and 110 of the general transport barges from the Corps of Engineers' annual <u>Transportation Lines on the Atlantic, Gulf, and Pacific Coasts</u>, Transportation Series 5, updated to December 1978 from other sources. The geographical distribution of barges of these types operating near the continental United States is shown in Tables 6-8 and 6-9, respectively. Information on the areas of operation of a number of the owner-operators was unavailable. In addition, barges in both categories characteristically shift their areas of operation from time to time.

Currently, the number of barges capable of operating in ocean and coastal waters exceeds demand. Most of the excess barges would be immediately available for emergency or mobilization use. In addition, barges committed to common carrier service may have seasonal fluctuations in business. During their slack seasons, these barges also could be immediately available. The individual owner-operator is in the best position to advise on availability.

Manning Considerations

Most ocean-classed barges are classed as unmanned. Personnel board them for unloading or loading, but only rarely is a barge manned during transit. Occasionally, when very high-value or high-priority cargo is carried, a trailer (providing all essential living accommodations) is placed on board for personnel during part or all of the voyage. The

TABLE 6-8 Numbers and Geographic Distribution of U.S.-Flag Ocean-Classed Tank Barges Operated Off the Continental United States, as of December 1978: Selected Operators[a]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	-	-	[illegible]
[illegible]		-	-	[illegible]
[illegible]	[illegible]	-	-	[illegible]
[illegible]	[illegible]	-	-	[illegible]
[illegible]		-	-	[illegible]
[illegible], Inc.		-	-	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[a] [illegible]

TABLE 6-9 Numbers and Geographic Distribution of U.S.-Flag Ocean-Classed General Transport Barges Operated Off the Continental United States, as of December 1978: Selected Operators[a]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	-	[illegible]	-	[illegible]
[illegible]	[illegible]	-	[illegible]	[illegible]
[illegible]	-	-	[illegible]	[illegible]
[illegible]	-		-	
[illegible]	[illegible]	-	-	[illegible]
[illegible]	-	[illegible]	-	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

[illegible]

Coast Guard normally will approve the manning of a barge on a trip-by-trip basis.

Vessel Description

Transport Barges

Oceangoing barges of 2,000 or more grt vary in length from 73 to 183 m (240 to 600 ft) and in width from 15 to 37 m (50 to 120 ft). Depth ranges from 5 to 14 m (16 to 45 ft).

Barges differ in a number of other ways. Many barges, constructed for special use in the offshore industry, are designed with a square slab bow and without skegs. Most of these are about 91 × 27 × 6 m (300 × 90 × 20 ft). They do not tow well and should be avoided for long-distance towage, although they are adequate for short distances. Barges equipped with skegs and shaped bows can be towed at relatively high speeds with good tracking capabilities in waves up to Sea State 4 (1.2 m or 4 ft). Generally, such barges can be towed at speeds of 8 to 11 knots, depending upon their depth in the water and the horsepower of the towing tug.

Unmanned barges, whether towed singly or in tandem, normally follow the towing vessel at a distance of about 450 to 600 m (1,500 to 2,000 ft). All ocean-classed barges carry (or should carry) a spare tow wire

for use in an emergency, as well as a buoyed trailing line to enable the towing tug to pick up the bitter end of the spare wire if the main tow wire breaks.

Barges also vary in compartmentation and in arrangements for ballasting and deballasting. Some barges have a centerline longitudinal bulkhead; others have 2 longitudinal bulkheads. Still others use the centerline longitudinal support and framing for strength, with limber holes to permit balanced flooding of both sides of the barge in case of leakage or cargo shift. Because of their multiple compartmentation, barges seldom sink if a leak occurs in a single compartment or if the cargo shifts. It is more likely that the barge would list or capsize. Barges especially designed for submergence may be equipped with internal pumps and piping for ballasting and deballasting operations. Portable pumps also can be used for ballasting and deballasting, thus reducing construction and maintenance costs on barges that are submerged infrequently.

Unless specially constructed, most deck cargo barges have deck loading capabilities of 5 to 10 metric tons per sq m (1,000 to 2,000 psf). However, barges can be partially or entirely strengthened on short notice to accommodate special loads. Other options include the addition of a 100- to 200-mm (4- to 8-in.) timber deck on top of the steel deck to achieve a uniform distribution of the load. Such a deck, whether of timber or asphalt, permits the working of crawlers, forklifts, or wheeled vehicles. Distribution of the load over longitudinal or transverse framing also is a common practice. Most companies operating barges have access to naval architects and load masters who are expert in this subject.

The majority of deck barges that exceed 61 m (200 ft) in length are capable of accommodating helicopters for landings during daylight hours and, if prescribed lights were installed, could operate helicopters at night. If particularly heavy, wheeled helicopters are used, it may be necessary to spread the wheel-load by adding deck matting over the landing area.

Some barges have additional specialty equipment. Some are equipped with generators to operate the anchor windlass or other deck machinery. The large hatches and high headroom characteristic of covered deck or house barges could allow for the transportation of helicopters or similar cargo. Ro/Ro barges are fitted with fifth-wheel stands for securing trailers on deck, and rail barges are fitted with tracks. Most deck barges can accommodate containers on deck with minimal expense for lashing and securing. Tank barges have pumps, hoses, booms, deck machinery, and fending equipment to suit their commercial applications.

The single U.S.-flag ice-breaking barge is powered by two 6,710-kW (9,000-bhp) tugs positioned in specially designed stern notches. It is capable of transporting deck cargo on its 15,800-sq m (170,000-sq ft) deck, petroleum or other liquid products in its center tanks, or both. The wing tanks and a molded ice-breaking bow provide substantial protection in the event of damage to its reinforced side shell. Use of the ice-breaking barge permits beach landings of deck cargo and POL (petroleum, oil, lubricants) behind a buffer of shore-fast ice, thus assuring protection from ocean swells during this normally hazardous operation.

Other Specialized Barges

This section includes short descriptions of pipe-laying, pipe-burying, and power-generated barges. Because of their relatively small numbers and marginal utility for the military functions previously defined, no Vessel Characteristics forms on these three types are included in Appendix A.

Pipe-Laying Barges. Although pipe-laying barges are usually without propulsion, some newer barges are powered and dynamically positioned. They are equipped with heavy-lift cranes, accommodations for up to 250 to 260 personnel, and sophisticated, dynamic-tensioned anchoring systems. These systems usually consist of 8 to 12 anchors of 15 to 30 tons each with 1,500 to 3,350 m (5,000 to 11,000 ft) of 60- to 75-mm (2.5- to 3-in.) wire. Pipe-laying barges are designed to maintain precise position over a pipeline, while continuing to weld the pipe sections and reposition themselves (by adjusting the anchors) as the welded pipe is added to the existing line. All are fitted with helicopter landing decks.

Pipe-Burying Barges. Burying barges normally follow pipe-laying barges. A submersible sled with powerful water-jet nozzles is slowly towed over the pipeline. The jets create a trench into which the pipeline descends. These barges normally require high-powered generating sources to operate the pumps on the jet sled. They usually have steam generators and extensive diving accommodations and equipment. Underwater closed-circuit TV systems and other electronic control and positioning systems are also standard equipment. The barges have accommodations for 150 to 250 personnel and are equipped with helicopter decks.

Power-Generating Barges. The 6 generating barges owned and operated by Consolidated Edison Company of New York are used to provide power to New York City and Westchester County during peak-consumption periods. The 32 generators of the 4 barge-mounted power plants moored in Gowanus Bay (on the Brooklyn side of New York harbor) have a total rated peak capacity of 688 MW; the 32 generators of the 2 barges moored in the Narrows (Brooklyn), a total of 393 MW.

Each of the 4 Gowanus barges is about 66.14 × 24.08 × 3.66 m (217 × 79 × 12 ft). Fully equipped, each weighs 3,800 tons and cost about $16 million in 1971. The transformers on the barges are connected by cables to shoreside power substations.

While the barges are moored during use, their design permits them to be towed to other strategic locations in an emergency. They are ABS-classed and fully seaworthy, and their beam was restricted to permit transiting of inland locks as well.

Each of the 8 gas turbines on each barge consumes fuel at the rate of 7.95 cu m per hr (35 gpm). Thus, the combined fuel consumption of the 4 Gowanus barges is about 254 cu m per hr (67,200 gph). Fuel barges

of 3,785-cu m (1 million-gal) capacity are moored in pairs across the pier from each pair of turbine barges. The turbines of the Gowanus barges have been operated on oil only, but the Narrows barges have been operated both on oil and on gas. Operating hours have been limited. During 1974, e.g., the total number of hours during which one or more of the Narrows barges' generators were in operation was 3,100 (or about 35 percent of the time). As available data do not indicate the number of hours during which each generator was on-line, their combined power output for the year cannot be determined.

Other, smaller-capacity U.S. power-generating barges also exist. In addition to those maintained by the military, a 15,000-kW gas turbine barge is maintained in Lake Maracaibo, Venezuela, by Creole Petroleum Corporation, a subsidiary of Standard Oil (New Jersey).

CRANE AND DERRICK BARGES

Industry Description

Crane and derrick barges generally are categorized as marine construction vessels. They perform a wide variety of tasks including structural erection, pipe-laying, and pile-driving. They are used in port terminal operations and the inland waterways, for maintenance support and salvage work, and to place or remove various navigational markers. Floating cranes and derricks also are used extensively in the offshore oil industry. The impetus provided by this industry has produced major advances in derrick and crane technology. Cranes of 500-ton lift capacity are now commonplace, and the number of cranes of 3,000-ton capacity is increasing.

In maintenance support for marine construction, cranes and derricks are needed to lift and transfer heavy equipment and materials, to lift small craft out of the water for repair (to alleviate overcrowding at drydocks), and for a number of other tasks. Cranes and derricks are also the primary equipment used for wreck removal and harbor clearance. On the inland waterways, revolving cranes outfitted with buckets serve as dredges.

Although, today, many heavy-lift ships are self-unloading, cranes and derricks still are needed to discharge heavy cargo onto wharfs, piers, or barges. They can perform this function not only in established terminals but also in ill-equipped, improvised, or damaged ports. Cranes and derricks also are used to implant buoys, drive piling for dolphins, and erect beacons, as well as to recover or move all of these.

In the offshore oil industry, very large modules are routinely moved or launched from barges at sea or in protected waters. Heavy-lift derricks with capacities up to 3,000 tons often are used. Many derrick barges are fitted with sophisticated, special-purpose equipment, and have quarters for 200 to 300 personnel. All are equipped with helicopter decks that meet Federal Aviation Administration (FAA) requirements.

Four general types of offshore oil industry barges have heavy-lift capabilities: (a) drilling barges, (b) pipe-laying barges, (c) pipe-

burying barges, and (d) derrick barges. In addition, two types of specialty barges are used to transfer modules that weigh 3,000 tons or more: (e) launch barges and (f) submersible barges. Launch barges use skid systems to offload. Submersible barges are submerged for loading and offloading and are particularly used for transferring floating equipment such as dredges and jack-up drill rigs.

Because the marine construction industry includes a variety of types of companies, ownership of crane and derrick barges is diverse. Shipyards, dredging companies, stevedoring organizations, diving companies, and some port authorities have crane and derrick equipment. As previously noted, the largest numbers of heavy-lift crane and derrick barges are owned and operated by firms specializing in offshore work.

Table 6-10 shows the principal owner-operators of ocean-classed specialized and heavy-lift barges, and the number of barges owned by each, by grt classification. Drilling platform barges are owned and operated by companies that specialize in offshore service and supply work.

Typically, owner-operators charter their cranes and derricks. These may be hired on an hourly, daily, weekly, monthly, or yearly basis.

TABLE 6-10 Numbers of Ocean-Classed Specialized and Heavy-Lift Barges by Selected Owner-Operators and Gross Tonnage

	Gross Register Tonnage (grt)							
Owner-Operator	2,000 to 3,999	4,000 to 5,999	6,000 to 7,999	8,000 to 9,999	10,000 to 11,999	12,000 and Over		Totals
Derrick Barges								
J. Ray McDermott, Inc.	3	3	5	3	1	-	15	
Brown & Root, Inc.	1	2	2	-	1	1	7	
Subtotal								22
Drilling Platform Barges and Drilling Tender Barges								
Penrod Drilling	-	5	3	-	-	-	8	
Reading & Bates Exploration Co.	3	5	-	-	-	-	8	
Rowan International, Inc.	2	-	4	-	-	-	6	
Atwood Oceanics	2	1	2	-	-	-	5	
Subtotal								27
Pipe-Burying Barges								
J. Ray McDermott, Inc.	-	1	2	-	1	-	4	
Brown & Root, Inc.	3	-	-	-	-	-	3	
Subtotal								7
Pipe-Laying Barges								
Brown & Root, Inc.	7	3	2	2	3	1	18	
J. Ray McDermott, Inc.	2	2	-	1	2	-	7	
Subtotal								25
Total								81

Charter costs vary with length of charter and with requirements of the job to be performed. In some cases, crane and derrick barges may be hired for a particular job on a lump-sum basis.

Vessel Availability

Since the ownership of cranes and derricks is so widespread, they can be found in most major ports, in all major shipyards, and on most inland waterways. Of owner-operators of cranes and derrick barges with lift capacities of 100 tons or more, a number are headquartered on the Gulf Coast. These include Bisso Marine Company; Brown & Root, Inc.; J. Ray McDermott & Company, Inc.; Raymond International, Inc.; Teledyne Movible Offshore; and Williams-McWilliams Company. One company (Gates Construction Corporation) is based in New Jersey; and 4 (Crowley Maritime Corporation, Oceaneering, Santa Fe-Pomeroy Marine Service, and Smith Rice Company) have headquarters in California.

Regardless of headquarters locations, heavy-lift cranes and derricks and offshore specialty barges are scattered throughout the world's major oil exploration areas. Their locations at any given time can be determined only by contacting individual owner-operators.

Logistic support is most critical for the large, sophisticated offshore equipment. Owner-operators of offshore equipment maintain their own network of U.S.-based and overseas facilities, each facility having its own spare parts inventory. The equipment usually is manned by highly trained crews.

In the last quarter of 1978, there was an oversupply of smaller floating cranes and derricks, and the current recession in the offshore oil exploration industry may leave some heavy-lift equipment under-utilized. In addition, the mounting of land-based cranes on suitable barges is a common practice. Used on a large scale, this method could quickly and dramatically increase the number of available floating cranes.

Manning Considerations

At a minimum, a modern crane requires an Operator, an Engineer, and a Crane Captain. In addition, there are usually at least two Riggers who also serve as Deckhands and work in shifts. If the crane is offshore, a Cook and an extra Deckhand are needed. In general, the larger the crane and the more sophisticated the machinery or mission, the larger the crew required. A sophisticated pipe-laying barge may have a crew of 300. Most of the personnel man the specialty equipment and are not directly involved in operating the crane.

Cranes with very large lift capacities require particularly skilled and experienced crews. A thorough engineering study often is required for particularly heavy lifts. Personnel with these skills are in great demand. Consequently, the owner-operator of heavy equipment often will retain on his payroll a nucleus crane crew capable of handling the larger cranes, even during slack periods.

The shortage of skilled heavy-lift personnel could present a major problem in the event of an emergency or mobilization. If these crew members were not exempt from military service, the industry could lose a critical asset at a time when expanded marine construction efforts were needed for the emergency or mobilization.

Vessel Description

Cranes manufactured by U.S. firms (e.g., American, Manitowoc, Clyde, Bucyrus Erie) are standardized by type and capacity. These cranes are either of the revolving type or have fixed or sheer legs. Invariably, sheer-leg derricks are constructed according to one design, as are stiff-leg derricks and others with limited range. Most fixed- or sheer-leg derricks can be fitted with jibs that extend the reach and drift capacity. (Reach is the horizontal distance of the boom head beyond its base. Drift is the vertical distance from the bottom of the fixed block on the boom head to the waterline.) Of course, extending the derrick's reach and drift reduces its lift capacity. Booms generally are sectionalized so that they can be extended to meet the requirements of the job.

Although cranes and derricks are standardized, the barges upon which they are placed and the manner in which they are used vary with the individual constructor or contractor. Moreover, actual lift capacity is governed by the size and configuration of the barge. While most derrick barges are not self-propelled, many have some positioning capability. Some have computer-controlled positioning systems; others are maneuvered by a harbor-mule system. A harbor mule is, in effect, a large outboard motor. In this application, it is semi-permanently mounted on the barge, but can be removed and mounted on another barge. Typically, its horsepower is in the 450- to 600-kW (600- to 800-bhp) range; some exceed 750 kW (1,000 bhp). The precision of control of harbor-mule systems varies. Some are radio-controlled, in the manner of those mounted on the bows of the lead barges of large inland river push-tow arrays.

7

OIL EXPLORATION, DRILLING, AND SUPPORT VESSELS

In the late 1940s the search for oil moved from the U.S. land areas to the offshore continental shelf in the Gulf of Mexico. From 1947 to 1955, the offshore service and supply fleet consisted of vessels converted from other services, such as fishing vessels, surplus military or landing craft, small patrol vessels, and crash boats. In the ensuing years, an increasing number of specialized vessels have been developed to support the offshore industry. Similarly, the first offshore drillrigs were adaptations of land rigs. Today, approximately one fifth of the drill rigs in use are self-propelled drillships.

By the 1960s, oil exploration by U.S. companies in other areas of the world had begun to expand rapidly. Today, offshore oil exploration is taking place in waters off every continent except Antarctica. The United States is not alone in this effort. Other nations have assembled fleets of oil exploration vessels; however, the United States still controls the largest number. Areas of current major U.S.-controlled oil exploration activity on the world's continental shelf are shown in Figure 7-1.

This chapter discusses three categories of vessels used in the offshore oil industry. The first and largest category is offshore service and supply vessels. These include crew boats, utility vessels, and supply and towing-supply vessels. The other two types are self-propelled drillships and semisubmersibles. Although not all semisubmersibles are self-propelled, the newest vessels do have this capability.

As noted previously, the offshore industry also employs many ocean-classed tugs and barges. All ocean-classed tugs, regardless of industry, were grouped together and discussed in Chapter 6. Similarly, specialized barges used in the offshore industry were included under "Ocean-Classed Barges" in Chapter 6.

OFFSHORE SERVICE AND SUPPLY VESSELS

Industry Description

Offshore service and supply vessels are essential to the oil exploration industry. The offshore service and supply fleet includes about 1,650 vessels operating on the U.S. continental shelf and about 400 U.S.-flag or U.S.-controlled vessels operating in other areas. The vessels range in length from 9 to 67 m (30 to 218 ft). Three categories of vessels are discussed in this section: (a) crew boats, (b) utility vessels, and (c) supply and towing-supply vessels. The offshore industry also employs many ocean-classed towing vessels and anchor-handling tugs (see "Ocean-Classed Tugs," Chapter 6). In addition, there are other specialized vessels, such as mud and acid boats, work-over vessels, diving-support vessels, and geophysical or seismic vessels. These are relatively few in number and are, therefore, not further addressed in this report.

Since U.S. maritime law reserves coastal trade to U.S.-flag vessels, all oil industry service and supply vessels operating to and from U.S. ports or in U.S. waters must be owned by U.S. citizens or corporations. Vessels operating in foreign waters need not be U.S.-flag, although they may be controlled by U.S. corporations. This section addresses both U.S.-flag vessels and vessels controlled by U.S. corporations. In addition, some information about vessels flying the flags of nations presumed to be friendly to the United States is included.

The modern offshore marine service vessels, particularly those with moderate cargo-carrying capacity, are capable of performing many tasks. The use of offshore service and supply vessels is usually arranged by contracts (either time or bareboat charter) between customers and the owner-operators of the vessels. Customers include all the major oil companies, most of the larger independent oil companies, drilling contractors, and gas transmission and construction companies.

An average of 3 support vessels is required per drilling unit or production platform. The type of drilling unit, depth of water, and distance from the port or supply base influence the size, speed, and number of vessels required. In general, a production platform requires fewer support vessels than does a drillship, semisubmersible drill unit, or pipe-laying barge.

Charter rates vary with the type and age of the vessel, the equipment, and the location. Rates, without fuel, may range from several hundred dollars per day for smaller crew boats to $5,000 to $7,000 per day. As of December 1978, the mean rate for a standard 53.34-m (175-ft) supply boat ranged from $1,800 to $3,500 per day. Larger vessels with higher horsepower and more equipment cost more to build and operate and, thus, command higher rates. Vessel supply and demand also affect the daily rate. The length of charter varies, but generally is specified in the contract. Charter agreements usually include provisions for termination of the agreement upon prior notice of 10 to 30 days.

Most oil companies procure service and supply vessels through competitive bid. Thus, the offshore industry is extremely competitive, particularly in foreign waters.

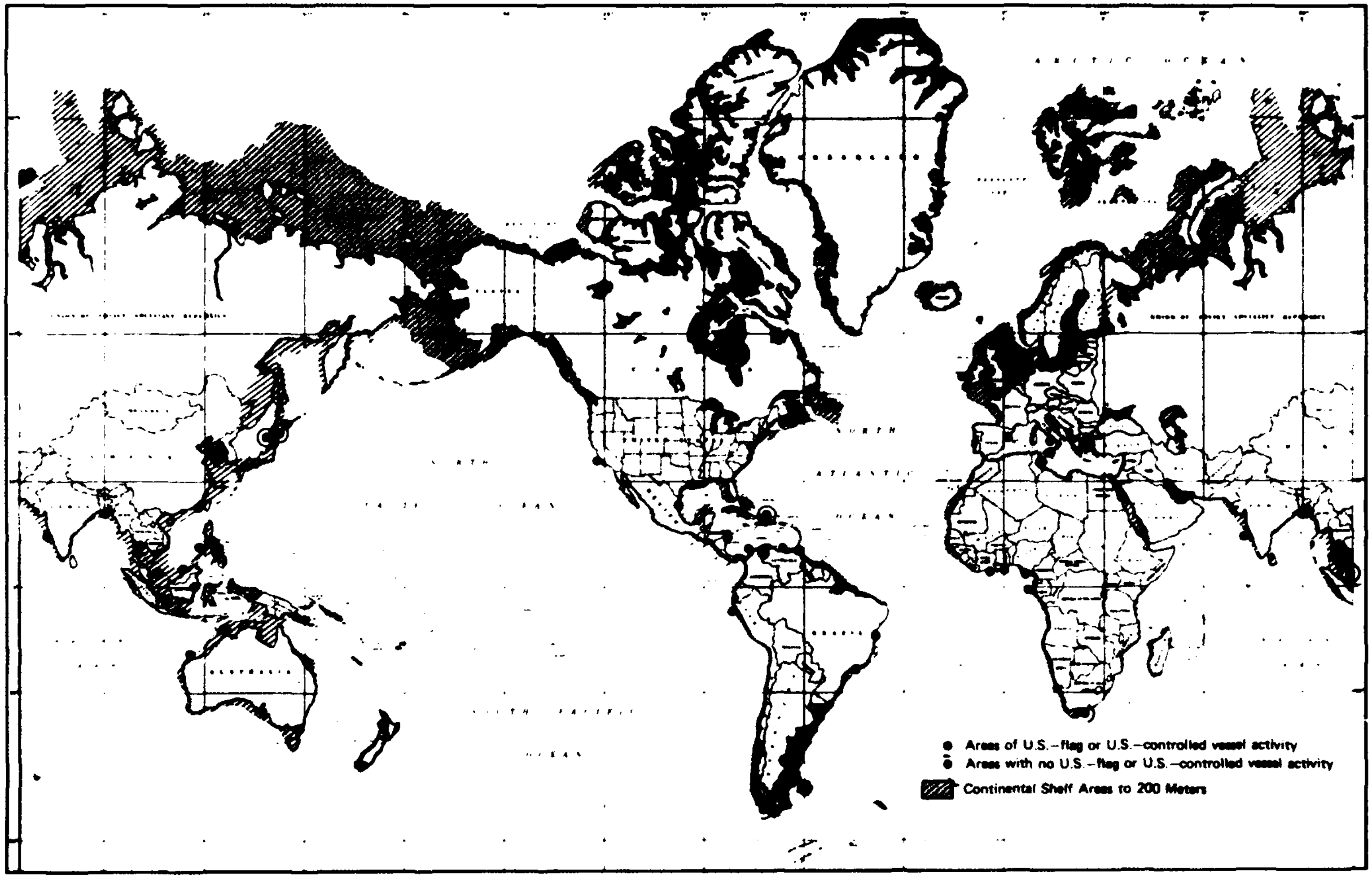


FIGURE 7-1 Major areas of offshore oil exploration activity, 1978

Table 7-1 provides an overview of the offshore service and supply fleets owned by 11 of the largest U.S. operators. The information in this table was obtained from several sources, including publications listed in Appendix C. Vessel tallies derived from the several sources do not coincide. The discrepancies stem from differences in the classification schemes used by each of the sources, the lag in publication of latest fleet additions and deletions, and, in some cases, incomplete information. The industry is changing rapidly; new vessels are being added, registrations are sometimes changed, and vessels of the fleet are frequently sold for use in other sectors of the maritime industry.

Vessel Availability

The largest concentration of offshore marine service vessels is in the Gulf of Mexico. About 1,650 crew, supply, and utility vessels operate in the Gulf; these are owned and operated by 178 companies. Many are small family operations or privately held one- or two-boat companies. Some companies specialize in certain kinds of vessels, such as crew boats or ocean tugs. Other companies own and operate vessels of several types; and a few offer a full inventory of all types of craft for charter.

Nine of the 11 companies listed in Table 7-1 have substantial fleets in the Gulf of Mexico. (The exceptions are Euro-Pirates International and John E. Graham and Sons.) In addition, the Seal Fleet Company has a

TABLE 7-1 Numbers of Offshore Service and Supply Vessels, by Type: 11 Largest U.S. Operators

Company	Tug/Supply & Supply	Utility	Crewboats	Other	Total
Tidewater Marine Service	160	20	48	9	237
Offshore Logistics	48	16	42	-	106
John E. Graham & Sons	-	74	-	-	74
Seahorse, Inc. (Petrolane)	54	-	9	7	70
Zapata Marine Service	39	-	2	-	41
Petrol Marine (Penrod Drilling)	20	2	14	-	36
Jackson Marine (Brown & Root, Inc.)	21	9	1	-	31
Gulf Mississippi Marine Corp.	27	-	2	-	29
State Boat Corp.	21	2	-	-	23
Euro-Pirates International	15	5	2	-	22
Otto Candies, Inc.	12	-	1	-	13
Totals	417	128	121	16	682

substantial fleet; Black Gold Marine operates a number of crew boats; and Nolty J. Theriot, Inc., operates a fleet of tugs.

Elsewhere on the U.S. continental shelf, offshore oil exploration activity is slow. Old fields off Southern California are serviced by about 40 vessels. There is still some exploratory activity in Alaskan waters, but the boat census is low. Exploratory drilling is taking place off the East Coast, but the results are not in and boat census is extremely low. Similarly, there is little activity off the Canadian coast.

There is a resurgence of offshore activity in Mexican waters. The need for U.S.-controlled craft is expanding, and this is expected to continue for some time. However, oil exploration in Mexican waters is government-controlled through Pemex, the national oil company. This may eventually reduce the demand for U.S.-controlled vessels. The major Mexican ports of operation are Carmen and Coatzacoalcos.

Further south, Brazil has a growing oil exploration industry, as well as ambitious plans for expansion. About 50 U.S.-flag or U.S.-controlled vessels are now operating off Brazil. Major U.S. owner-operators include Offshore Logistics, Tidewater Marine, Euro-Pirates, Seahorse (Petrolane), Zapata Marine, and Astro Marine. The largest customer in Brazilian waters is PetroBras, the national oil company. Recently, however, some of the major international oil companies have established drilling positions off Brazil. The major Brazilian ports of operation are Victoria, Belem, and Salvador.

Finally, there is some activity off Venezuela and Trinidad. Venezuela's industry is also nationalized, and no U.S.-flag or U.S.-controlled vessels are in service there. Trinidad has a census of about 14 boats. Data were lacking on whether any of these are U.S.-flag or U.S.-controlled. The major ports in Trinidad are Port of Spain, Point Fortin, and Galiota Point.

Turning to the Eastern hemisphere, six major areas have active U.S.-flag or U.S.-controlled fleets: Northern Europe, the Mediterranean, Egypt, the Middle East, West Africa, and Indonesia and Singapore. Each is described briefly below.

The major North European maritime nations all possess offshore service and supply vessels. In general, these vessels resemble U.S.-flag vessels, although numerous variations in design, internal arrangement, equipment, and fit-out may be found. The expansion of foreign-owned fleets in the North Sea and adjacent waters has dramatically reduced the numbers of U.S.-flag vessels working that area. At present there are over 150 British, Dutch, West German, and Norwegian vessels in these waters. Few, if any, large U.S.-flag towing and supply vessels remain. There are, however, 20 to 30 foreign-flag, U.S.-owned or jointly owned vessels.

In the Western Mediterranean there are 25 to 30 U.S.-flag or U.S.-controlled service and supply vessels. The vessels vary in size and age. Major U.S. operators include Tidewater Marine, Offshore Logistics, and the Offshore Company. The major ports of operation are Ravenna and Siracusa, Italy; Valletta, Malta; and several Libyan ports.

Several oil companies, such as the West German firm, Amoco Deminex, and the Italian firm, AGIP, operate in Egyptian waters under Egyptian government auspices. It appears that the level of activity in these

waters will continue to increase. The U.S. operators currently servicing this area include Gulf Mississippi Marine and Tidewater Marine. At present, there are about 25 vessels in these waters. The major ports are Alexandria, Suez, Port Said, and Ras Shukheir.

The Middle East is a very active area. From 70 to 80 vessels are employed by oil companies in partnership with the countries bordering the offshore fields. Among the most important are companies working with Saudi Arabia, Kuwait, Abu Dhabi, and Iran. The U.S. service and supply companies working this area include Tidewater Marine, Zapata Marine, Offshore Logistics, Seahorse, and Gulf Mississippi Marine.

The coasts of Nigeria, the Congo, Zaire, Angola, and the Ivory Coast are all sites of major oil exploration activity. A number of U.S. companies service the West African waters including Tidewater Marine, Zapata Marine, Seahorse, and Offshore Logistics. The boat census varies but, in recent years, has averaged 50 to 60 vessels.

Finally, there is an average of about 100 vessels in the waters off Indonesia and Singapore. These operate under a variety of flags and ownership. Companies with vessels in the area include Tidewater Marine, Petrol Marine (Penrod Drilling), Offshore Logistics, and Zapata Marine.

Vessels operating on the U.S. continental shelf have domestic logistic support systems. In addition, many companies operating in foreign waters have established overseas base ports in their major areas of operation. Whether or not such a foreign base port is established for the exclusive use of the vessel owner-operator will depend on a number of factors, including:

- Attitude of local and national governments;
- Availability of dock space and waterfront facilities;
- Whether or not the customer has facilities and is willing to provide space;
- The size of the fleet deployed;
- Distance of operations from the coast and from sources of supply;
- Availability of scheduled steamer, container, and air freight service; and
- Duration of contract.

Whether or not a base port is established, companies operating in foreign waters must develop some means of meeting minimum logistic requirements. The support requirements for operation of service and supply vessels include local sources of food and consumables; local sources of repair and maintenance; land and air transport for large spare parts and hardware; fuel and oil supply; and established procedures for obtaining qualified seamen and new crews, wherever the vessel is operating.

If a company has established a base port, the facility may include:

- Office and staff commensurate with size of operation;
- Dock and limited warehouse facilities;
- Inventory of stores, spares, and consumables that are not obtainable locally but are essential to dependable sustained operation (including large machinery spares and shafts and propellers);

- Communications, including radio capability to vessels, if feasible, and telex and telephones to home offices; and
- Some minor maintenance and repair capability, if warranted.

The logistic support systems developed to sustain offshore service and supply operations overseas represent a major national maritime resource. However, maintenance of these support systems is not without its problems. In developing areas, U.S.-made products are often in short supply and must be stored on site or be air-freighted in as needed. Once supplies have arrived, their delivery to the vessel can be difficult. In overcoming these and other minor problems, knowledge of local laws and customs, and a good relationship with local officials are vital company assets.

The personnel working on offshore service and supply vessels are generally skilled in making minor repairs. Base ports in foreign waters usually have spare parts inventories. However, in most foreign areas of offshore operation, shipyards are not readily accessible. Generally, vessels must travel for as much as a week or 10 days to reach a suitable repair or drydocking facility. In developing nations, repairs of any magnitude present many difficulties and require a long lead-time. In developed nations, particularly those with a marine tradition, it is usually easy to effect repairs. Most shipyards on the U.S. Gulf Coast specialize in offshore service and supply vessels and are, therefore, fully equipped to handle any required repairs.

Mobilization of offshore service and supply vessels would have economic consequences for the oil exploration industry as a whole, as well as for the service and supply companies themselves. The oil exploration industry is predicated on long-term development plans. Since these vessels play an important part in the functioning of the industry, it must be recognized that removal of vessels from a particular area of operation may substantially disrupt or delay development or production.

Removal of vessels servicing U.S. oil companies could directly reduce U.S. offshore oil production. If some production facilities had to be shut down and such shutdowns were not handled carefully, it might prove difficult to re-establish production efficiently after the emergency was past. Thus, in the face of a shortage of supply vessels, some oil companies might choose to abandon exploratory drilling projects rather than reduce production.

Removal of service and supply vessels would prompt U.S. oil companies to search for alternative means of supply or alternative support vessels. In certain foreign areas, no alternative vessels are available. In others, it might be possible to use ocean-classed tugs and barges for service and supply. However, these vessels are less maneuverable in close quarters and alongside and are also more susceptible to the vagaries of wind and weather.

Steps could be taken to minimize the disruption of oil exploration and oil production schedules. Adequate time should be allowed for the development of support and supply alternatives. This is, perhaps, best accomplished by involving vessel owner-operators and customers (the oil companies and other charterers) in the early stages of planning for any vessel call-up that may affect development and production. These

parties, with their knowledge of local conditions, can provide information on which vessels should be nominated for mobilization. This approach should reduce conflicts over vessel use. Also, a sharing of the vessels remaining in a given area may be in order. This would entail a pooling of resources--a type of cooperation not usual in a business that, in peacetime, is highly competitive.

Finally, political considerations must be taken into account in many overseas areas of operation. Countries that are in the early stages of offshore oil production are most vulnerable; removal of service and supply vessels from these areas could have serious economic and political consequences. Thus, mobilization of vessels from certain overseas areas must be done with particular care. There often is a delicate relationship between the vessel owner-operators and the host country. Ideally, arrangements should be made so that vessel operators would be able to return to the area immediately after the emergency is over.

The Offshore Marine Service Association is an excellent source for information about general offshore operations and the operation of specific companies. The Association includes 210 individuals and companies that own and operate offshore service vessels.

Manning Considerations

The offshore service and supply industry experiences chronic shortages of skilled officers and seamen. In part, shortages are due to the sustained growth of the fleet over the last 10 years. In addition, there are regulatory impediments to increasing the manpower pool. These impediments arise from the application of laws passed many years ago to regulate crew requirements on vessels of wholly different types engaged in other types of operations. Also, the offshore service and supply industry has unusually high man-per-billet ratios.

The normal work tour for all crew members in the U.S. Gulf of Mexico is 7 days on board and 7 days ashore. Since work tours also vary with the individual, the man-per-billet ratio in these waters is 2.5. In foreign waters, work tours vary from 3 to 6 months on board and 1 to 3 months ashore. The man-per-billet ratio varies from 1.8 to 2.3. Individual preferences and environmental conditions are important determinants of the length of tours of duty.

The skills required of officers and seamen are similar to those required on other vessels. Masters and Mates engaged in offshore work must possess additional skills, such as complete competence in vessel handling in close quarters and alongside, as well as comprehensive knowledge of sea states and wave characteristics.

The industry provides training in seamanship, navigation, and vessel operation. Most training is provided through company-run programs. State and local schools provide some entry-level training and also participate in training programs designed to upgrade the skills of experienced seamen. Vessel-handling skills are acquired on the job. In spite of the number of training programs, the number of graduates does not compensate for the number of personnel lost through attrition and

retirement. The number of entry-level ratings issued to new personnel is high, but their turnover ranges from 70 to 100 percent per month.

If large numbers of these vessels were mobilized, there probably would be an acute shortage of qualified personnel. The majority of men currently employed on these vessels probably would be available for service in the national interest, at least in the early stages of a moderate-duration mobilization. However, since there is already a manpower shortage in the industry, and since some of the seamen currently working in the industry may not be available, alternate sources of seamen and officers would have to be found. Options include: (a) government-sponsored training programs for entry ratings; (b) waiver of regulatory agency authority regarding vessel manning, licensing of officers, and certification of seamen; and, in lieu of waiver, (c) mobilization of the vessels as military vessels.

U.S.-owned, foreign-flag vessels are manned in accordance with the laws of the flag state, international treaties, and the local laws of the host nation. In general, owner-operators have few problems in obtaining officers and seamen who are licensed or certified either under the laws of the host state or under the international Safety of Life at Sea (SOLAS) Convention.

If U.S.-owned, foreign-flag vessels were needed in a national emergency, deployment of U.S. citizens as officers and seamen should be considered. Although it can be anticipated that a small percentage of foreign-licensed officers and foreign-certified seamen might be available to serve, the numbers cannot be determined.

Vessel Description

Support craft are vital to all phases of the offshore oil and gas industry, from the early exploration stages through drilling, installation of production equipment, and laying of the pipeline that will deliver the product. Offshore service and supply vessels can be grouped into three general categories: (a) crew boats, (b) utility vessels (supply boats and utility boats), and (c) supply and towing-supply vessels. The characteristics of vessels in each category are described below. Information on how large supply vessels might be modified to increase their capabilities to perform other functions is included.

Crew Boats

By industry practice, crew boats are categorized by length, which is considered the basic indicator of vessel capability. In general, a vessel's length provides a good indication of speed, passenger-carrying capacity, horsepower, range, and seakeeping characteristics.

<u>30- to 40-Meter (100- to 130-Foot) Crew Boats</u> These vessels are built of welded aluminum. They are designed for extended offshore operation at speeds of 14 to 25 knots in moderate seas. Vessels in this class are all diesel-powered and most are triple-screw, with total power ranging

from 750 to 1,900 kW (1,000 to 2,500 bhp). These vessels service structures or drill units 25 to 200 nmi offshore. They carry 40 to 80 passengers in bus-type seating. Limited amounts of deck cargo (14 to 25 metric tons, or 30,000 to 56,000 lb) may be carried. Most are built to ABS or other classification society standards, have loadlines, and, as U.S.-flag vessels, meet Coast Guard certification requirements. Navigation equipment includes radio, two radar sets, gyro compass, autopilot, LORAN, and fathometer.

<u>18- to 30-Meter (60- to 99-Foot) Crew Boats</u> This class is normally built of welded aluminum, but some lightweight, all-welded steel vessels can be found. The vessels are primarily used to transport 25 to 40 persons in bus-type seating. Cargo-carrying capabilities are limited to 1 to 5 metric tons on the afterdeck. These vessels have good seakeeping characteristics in seas up to 1.5 m (5 ft) in height. They are twin-screw, diesel-powered, rated from 375 to 900 kW (500 to 1,200 bhp), and can operate at ranges of 200 to 400 nmi, with speeds of 10 to 25 knots. Despite their range, boats in this class are generally used on trips of less than 75 nmi offshore. Navigation equipment includes radio, radar, magnetic compass, and such other equipment as is required by the client.

<u>9- to 18-Meter (30- to 59-Foot) Crew Boats</u> These are small inland craft constructed of lightweight welded steel or aluminum. Most are certified by the Coast Guard to carry 10 to 25 passengers on inland waters, lakes, bays, and sounds, or nearby coastal waters. Generally, their range is limited to 300 nmi. Speeds vary from 13 to 26 knots. With twin-screw diesel propulsion, power ranges from 225 tp 450 kW (300 to 600 bhp). Small amounts of deck cargo (0.5 to 1 metric ton) can be carried on the open area aft of the cabin, the amount varying with the vessel. Although navigation equipment is normally limited to radio and magnetic compass, other equipment may be installed as dictated by the waters navigated. The first vessels of this type were designed for Tidewater Marine's Venezuela operations. During the Vietnam conflict, crew boats of the aluminum-hulled 15.24-m (50-ft) class were used by the Navy as PCFs (Patrol Craft, Fast). Vessels are widely dispersed among a large number of owners and operators. No Vessel Characteristics form for this class is included in Appendix A.

Utility Vessels

Utility vessels (supply boats and utility boats) range in length from 60 tc 120 ft (18 to 37 m) and are normally built of steel. The vessels are diesel-powered, twin-screw, and capable of speeds of 10 to 12 knots. Although hull designs and fit-outs vary, the pilot house generally is placed well forward to maximize the clear space on the afterdeck. The size of this area varies with the length of the vessel, ranging from 37 [illegible] sq m (400 to 1000 sq ft). Deck cargo capacity ranges from 0.5 to [illegible] metric tons (1,000 to 60,000 lb). Although there is a wide variety [illegible] horsepower combinations, the vessels normally range from 225 to 1,500 [illegible] 2,000 bhp). Vessels are versatile and perform a variety of [illegible] in support of offshore drilling and production. While they

lack the size and special equipment found on the larger supply and towing-supply vessels, their design and layout are well suited to production work.

Supply and Towing-Supply Vessels

Supply vessels are key to any development offshore. They typically transport almost every piece of structure, equipment, and pipe, as well as food, fuel, and water, to the drilling or production unit. Supply vessels vary widely in size, fit-out, and machinery. They range in length from 18 to 67 m (60 to 218 ft). Their value as support vessels depends upon these variations, as each is designed to operate at certain distances offshore, in certain weather states, and to perform specific kinds of support missions. However, there are basic requirements that should be met by all offshore supply vessels. These include:

- Large unobstructed deck area (generally, the after main deck);
- Excellent all-around visibility from the pilot house;
- Good speed (ranging up to 15 knots, cruising; 17 knots, maximum);
- Excellent handling characteristics (adequate horsepower and accessory equipment, e.g., bow thruster, twin screws);
- Capability to lift adequate amounts of cargo;
- Ample bulk mud carrying capability;
- Good range;
- Extra fuel capacity and pumping equipment;
- Liquid-carrying capacity;
- Economy of operation;
- Rugged construction;
- Capability of being operated safely by a small, but skilled, crew;
- Comfortable quarters for the crew and modest extra berthing; and
- Dependable machinery with ample redundancy and vessel-generated electricity.

Generally, the modern towing-supply (or tug-supply) vessel is a large supply vessel equipped with a powerful towing winch, cables, chains, bridles, and the other fittings and gear necessary for the wide variety of towing operations that are daily occurrences in the offshore industry.

Given adequate horsepower, both supply vessels and towing-supply vessels may be equipped to perform anchor-handling work by adding specialized fittings and extra gear. The installation of such equipment requires highly skilled and experienced shipyard personnel.

The typical larger supply vessel can carry moderate amounts of packaged cargo on its open afterdeck--although consideration must be given to the advisability of transporting deck cargo that may be damaged by boarding seas. The majority of these vessels also can carry either liquid cargo or additional fuel (to extend vessel range) in their ballast and mud tanks, without major modification. Some already have been modified to permit liquid cargo transport.

Conversion of supply vessels for the carriage of general cargo (packaged, containerized, or palletized) on deck would require

installation of padeyes, clips, and hold-down gear. Such minor alterations could be made at any topside facility. More extensive alterations, such as the installation of pipe and pumping systems to convert ballast tanks to fuel storage space, would require shipyard facilities and specialized expertise. Many shipyards on the U.S. Gulf Coast have the required capability, since the majority specialize in offshore marine service vessels.

DRILLSHIPS

Industry Description

Self-propelled drillships comprise about 20 percent of all offshore oil rigs owned by U.S. companies. In the early 1950s, drilling for crude oil expanded from onshore to the offshore continental shelf. Although it was more expensive to build an oceangoing drill rig than a permanent land rig, the mobile offshore rig could be used to drill several wells and, therefore, had great value as an exploration vessel. Between 1950 and 1978, 57 drillships were newly constructed or converted for U.S. owners. Although almost all offshore drilling is on the continental shelf, drillships are capable of drilling wells to 7,600 m (25,000 ft) in water depths ranging from 6.4 m (21 ft) to unlimited. In 1976, offshore fields accounted for 15 percent of total world oil production and about 11 percent of total U.S. oil production.

Occasionally, a drillship will be modified for ocean mining or deepwater salvage work, but these are exceptions.

Some drillships have sophisticated electronic systems. For example, continued expansion of offshore development in severe environments and deep water has increased the need for data on sea and weather conditions, as well as on the response of offshore rigs to these conditions. Thus, the use of comprehensive environmental data gathering systems on offshore rigs is expanding. One such system, installed on several drillships, continously monitors meteorological and oceanographic conditions, while platform performance sensors analyze the data in real time and provide information to support decision making.

There are 42 active U.S.-flag drillships. The entire commercial fleet is owned by 15 companies. As shown in Table 7-2, the largest number of vessels is owned by Global Marine, Inc. Foreign oil companies have chartered 6 and U.S. oil companies operate 34. The National Science Foundation and the Nova Scotia Department of Mines each operate one.

Commercially, the drillship fleet is handled in much the same manner as offshore service and supply vessels. Usually, a drillship is operated under a contract between the vessel owner and an offshore operator. The operator is normally responsible for supplying the crew and all support vessels, as well as for expenses related to the drilling process. The areas of operation are determined by the charter.

TABLE 7-2 Numbers of Drillships by Owner-Operator

Owner-Operator	Number of Vessels
Global Marine, Inc.	17
The Offshore Co. & International Drilling Co.	7
Atwood Oceanics, Inc.	4
Southeastern Drilling Corp. (SEDCO)	4
Ocean Drilling & Exploration Co. (ODECO)	3
Reading & Bates Offshore Drilling Co.	3
Zapata Corp.	3
Associated Marine Services, Inc.	2
Fluor Corp.	2
Mission Drilling & Exploration Corp.	2
Ogden Marine Drilling Inc.	2
Golden Lane Drilling Co.	1
Marine Drilling & Coring Co.	1
Progress Marine, Inc.	1
Santa Fe International Corp.	1
Total	53

Vessel Availability

Table 7-3 shows the geographic distribution of U.S.-flag drillships. The highest concentration is off the U.S. Gulf Coast, although drillships also operate off the West Coast and a few operate off the East Coast.

The large storage capacities normally built into drillships allow them to move unassisted to remote exploration sites and maintain drilling operations for periods up to 100 days without resupply. Since drillship personnel are frequently called upon to operate in remote areas for extended periods, they are experienced in effecting minor repairs and ensuring adequate maintenance of machinery and equipment.

The main function of drillships is exploratory drilling. Thus, short-term government call-up of drillships would not have an immediate adverse economic impact. However, the economic and political factors previously discussed in the section on "Vessel Availability" under "Offshore Service and Supply Vessels" also would apply to longer-term mobilization of drillships.

Manning Considerations

The average drillship can accommodate a crew of 80. A 122-m (400-ft) drillship requires a crew of 6 officers and 15 seamen. In addition,

TABLE 7-3 Geographic Distribution of U.S.-Flag Drillships

Geographical Area	Number of Vessels		
North America	15		
Worldwide [a/]	8		
Western Pacific	5		
South America	4		
Africa	3		
Middle East	3		
Mediterranean	3		
India	1		
Total Active		42	
Removed from Service		9	
Idle		6	
Total			57

a/ Not currently assigned to a specific area.

each drillship carries a drilling crew of 10 to 20 men. Since sophisticated electronics and machinery are common on drillships, approximately 25 percent of the personnel are technicians.

Vessel Description

Many existing drillships are converted general cargo and bulk cargo vessels; however, since 1970, hulls have been constructed specifically for offshore exploration for oil and natural gas and for deep-water drilling. Drillships range from 52 to 195 m (170 to 639 ft) in overall length, with beams limited to 32 m (105 ft) to permit passage through the Panama Canal. The smallest class has a draft of 2.4 to 5.2 m (8 to 17 ft), with the largest vessels drawing 7.6 m (25 ft). Most drillships are twin-screw, powered by diesel or diesel-electric engines. Power ranges between 750 and 2,700 kW (1,000 and 3,600 bhp) in the smaller, 52- to 98-m (170- to 320-ft), vessels; and between 4,500 and 12,000 kW (6,000 and 16,000 bhp) in the larger, 158- to 195-m (520- to 639-ft) drillships. Speeds range from 11 to 15 knots, and vessels can operate in sea states up to 12.2-m (40-ft) waves.

The vessels are designed to support the drilling operation, which is carried out from a tower mounted on the main deck at the midship point. The drill string extends down through an opening in the hull, called the moonpool, to the ocean floor. All available stowage space and tankage aboard the vessel is dedicated to support of the drilling operation. Many of the tanks that are now outfitted for bulk cement, barite, liquid

mud, and drill water could be converted to carry fuel oil or helicoptor fuel, as necessary.

All drillships are fitted with cranes or derricks of varying capacities and outreaches for handling drill pipe, heavy or outsized equipment, drums, and supplies. Sufficient deck space with capacity for heavy concentrated loads is available, especially if the pipe racks are emptied or off-loaded. All vessels are outfitted with helipads and sophisticated dynamic positioning systems to accurately maintain the ship's position over the drill site. They are also equipped with elaborate communications and navigation equipment.

The smaller drillships have a range of 9,000 nmi. There is adequate space for supplies for 50 days for up to 86 personnel, including scientists and technicians. The largest drillships can remain at sea for as long as 100 days and can accommodate 136 people. Cargo areas (dry and refrigerated stores spaces) below deck are limited and generally reserved for crew consumables.

SEMISUBMERSIBLES

Industry Description

Semisubmersibles make up almost 25 percent of offshore oil rigs owned by U.S. companies. Avondale Shipyards (New Orleans) built the first semisubmersible in 1963. The first self-propelled semisubmersible was built in Japan by Mitsubishi Heavy Industries (Hiroshima) in 1971. Both rigs were ordered by Ocean Drilling and Exploration Company (ODECO), a New Orleans-based drilling company. Investment in this type of drilling rig has been dominated by U.S. companies.

Semisubmersibles are extremely seaworthy when set in the drilling position. When positioned, the platform is supported by 6 or 8 legs based on 2 pontoons. This geometry makes for a minimal response to waves. Because of their weather tolerance, semisubmersibles are used where there is a high frequency of rough seas.

Semisubmersibles are used in areas where a mobile rig will facilitate exploration. They also serve as support and repair vessels for drillships and jack-up oil rigs in addition to performing maintenance, diving, and salvage operations. Semisubmersibles are equipped for offshore construction work. Mud and cement pumps are fitted, as are heavy-lift derricks and cranes. All vessels have open deck space and well-equipped machine shops. Non-self-propelled semisubmersibles require an average towing power of 7,500 kW (10,000 shaft horsepower).

There are 73 U.S.-flag semisubmersibles, of which 33 are self-propelled. The U.S. fleet is owned by 16 companies. Southeastern Drilling Corporation (SEDCO) owns the largest number (23), ODECO owns 12, and the remaining companies own from 1 to 9 each (see Table 7-4).

Semisubmersibles are chartered by drilling operators. Vessel operation is entirely the responsibility of the lessee. Practically all rigs are leased to oil or gas companies. Normally, the company will drill in water near its home country. For example, of the 14 U.S.-owned

TABLE 7-4 Numbers of Semisubmersibles by Owner-Operator

Owner-Operator	Number of Vessels
Southeastern Drilling Corp. (SEDCO)	23
Ocean Drilling & Exploration Co. (ODECO)	12
Santa Fe International Corp.	9
Zapata Off-Shore Co.	6
Penrod Drilling Co.	5
Diamond M. Drilling Co.	3
Dolphin International, S.A.	3
Western Oceanic, Inc.	3
Transworld Drilling Co.	2
Atwood Oceanics, Inc.	1
Exxon, U.S.A.	1
Field International Drilling Co.	1
Key International Drilling Co., Ltd. (Keydrill)	1
Marlin Drilling Co., Inc.	1
The Offshore and International Drilling Co.	1
Rowan International, Inc.	1
Total	73

semisubmersibles now working in the North Sea between England and Norway, 12 are operated by European oil companies.

Vessel Availability

About 17 semisubmersibles are now operating in the North Sea; 10 of these are self-propelled. The Gulf of Mexico has 22 vessels, only 6 of which are self-propelled. Exploration off the U.S. East Coast has been delayed because of environmental concerns. However, there are 4 working mobile rigs in that area and more are on the way. Table 7-5 shows the worldwide geographic distribution of U.S.-flag semisubmersibles working in the last quarter of 1978.

Production and repair facilities are located on the West, Gulf, and East Coasts of North America, as well as in Norway, West Germany, the Netherlands, Spain, Japan, and Australia. Since semisubmersibles are often used for offshore repair and construction, their self-repair capability is high; all have machine shops. All semisubmersibles are equipped with modern communication equipment and are easily contacted anywhere in the world. All have helicopter decks.

If all semisubmersibles were removed from commercial employment, half of all U.S. offshore oil exploration would stop. And, with U.S. offshore fields now supplying about 11 percent of total U.S. oil

TABLE 7-5 Geographic Distribution of U.S.-Flag Semisubmersibles

	Number of Semi-Submersibles		
Geographical Area	Self-Propelled	Not Self-Propelled	Total
Gulf of Mexico	6	16	22
North Sea	10	7	17
South America	3	5	8
Australia	2	3	5
U.S. East Coast	4	1	5
Africa	-	4	4
Alaska	2	1	3
Mediterranean	1	2	3
U.S. West Coast	3	-	3
Caribbean	2	-	2
South East Asia	-	2	2
Middle East	-	1	1
Totals	33	42	75

production, production would be reduced by more than 5 percent. Also, because it is expected that offshore reserves will supply an increasing proportion of future U.S. oil production, the potential for adverse economic impact arising from government call-up of semisubmersibles will increase over time.

Manning Considerations

Semisubmersibles can remain at sea for 50 to 100 days, depending on vessel size. Crew accommodations vary between 80 and 100. The number of personnel required to maintain a semisubmersible depends on the vessel's mission but the average drilling crew consists of 20 engineers and mechanics.

A highly skilled drilling crew is required. Much of the effort on any offshore drilling rig is scientific, requiring geologists and technicians. The owner of the semisubmersible is normally responsible for providing the crew.

Vessel Description

Self-propelled semisubmersibles range in length from 55 to 122 m (180 to 399 ft). The vessels are diesel-powered, twin-screw, and capable of speeds of 8 to 10 knots. Power ranges from 4,500 to 6,000 kW (6,000 to 8,000 bhp). The larger vessels may remain at sea for up to 100 days and have a range of 9,000 to 14,000 nmi.

The non-self-propelled vessels are 62 to 115 m (202 to 377 ft) long. Required towing power ranges from 2,700 to 10,500 kW (3,600 to 14,000 bhp) and the maximum towing speed is 5 to 10 knots.

Unlike a ship, a semisubmersible is supported and buoyed by vertical legs that stand on pontoons. The propulsion machinery is contained in the pontoons. Like a tabletop, its deck sits on the legs. The centerpiece is a single drilling tower, rising 76 to 107 m (250 to 350 ft) above the deck. Platform space is occupied by tanks for cement, mud, fuel, and water; storage for pipe sections; and automated pipe-handling machinery. About 20 percent of the deck area is reserved for a helipad and most semisubmersibles have storage tanks for helicopter fuel. Crew accommodations are modular, with air-conditioned berths for 43 to 100, the average being 80. All semisubmersibles are fitted with a combination of cranes and derricks; normally found are two cranes rated at 50 tons and a derrick rated at 600 tons capacity.

On top of the corner legs are heavy-duty winches that act as anchor windlasses. The winch drums are controlled by a monitor that maintains a fixed position over the well by making the necesary adjustments to the lengths of the anchor chains. In the drilling position, the semisubmersible's wide base is submerged and steadied by 6 or 8 radiating anchors. All vessels have fire fighting capability and are outfitted to handle minor repairs or modification work while underway or on station.

8

FISHING VESSELS

An analysis of the records of the USCG Data Bank in August 1978 showed 5,538 fishing vessels of 50 or more grt documented in the ports of 33 states, the District of Columbia, Puerto Rico, Guam, and the Virgin Islands. Their geographic distribution is given in Table 8-1. As indicated in the table, only 373 (7 percent) of the vessels are of 200 grt or more.

The data do not reflect some newly constructed vessels. Similarly, some vessels that are no longer in the U.S. fishing fleet due to sale or transfer to foreign registry or sinkings are still listed. Nevertheless, the data shown in this table are indicative of the general geographic distribution of larger U.S.-flag fishing vessels.

Of the 86 vessels of 200 or more grt registered on the East Coast, 36 have home ports in Virginia and 21 in Massachusetts. Of the 88 Gulf Coast vessels of 200 or more grt, 67 have home ports in Louisiana and 13 in Biloxi, Mississippi. Of the 160 West Coast vessels of 200 or more grt, 78 have home ports in California, 41 in Juneau, Alaska, and 31 in Seattle, Washington. All 35 vessels of 200 or more grt working out of island ports are documented in Puerto Rico. On inland waters, 2 of the 4 vessels of 200 or more grt list Detroit, Michigan, as their home port.

The balance of this chapter reviews five sectors of the U.S. fishing industry: tuna, menhaden, king crab, trawler and groundfish, and shrimp fisheries. These sectors have been chosen both because they provide a good geographic balance and because they are the dominant U.S. fisheries. Of the fishing vessels of 200 or more grt, 85 percent are engaged in the tuna, menhaden, or king crab fisheries.

TUNA BOATS

Industry Description

In 1976, commercial landings of tuna in the United States, Puerto Rico, and American Samoa totaled 299,300 metric tons (659.9 million lb) valued at $199.8 million. In 1977, the catch declined by 29 percent, due to litigation over the incidental catch of porpoises. Tuna fishing by seining vessels virtually ceased during the early part of 1977 and did not resume until mid-May after a compromise quota had been established. Nevertheless, the total value of the 1977 catch was $181.6 million, a decline of only 9 percent from the previous year.

The U.S. tuna fleet operates in the eastern Pacific; central, western, and southern Pacific; Caribbean; northwestern Atlantic; and eastern Atlantic. The vessels are classified as either seiners or baitboats. There are 128 vessels that use the purse seine technique and 41 baitboats. Baitboat tuna vessels fish exclusively off the coast of Mexico, as do most of the wooden-hulled seiners and smaller (less than 50 grt) steel-hulled seiners. The larger (200-1,600 grt) purse seine vessels are found throughout the other ocean regions.

Both purse seiners and baitboats use refrigeration systems that freeze the fish for use by processors of canned tuna and tuna by-products. Each owner or operator sells the catch from each voyage to processing companies at the prevailing market prices. Although some price stability results from negotiations between tuna fishery associations and processing companies, actual rates vary with supply and demand.

Most tuna vessels are owned and operated by small corporations controlled by families or individuals through majority stock holdings. In addition, a few major public corporations own controlling interests in corporations operating tuna vessels. These vessels usually are operated by someone who also owns an interest in the company. Tuna vessels are rarely leased or chartered, although time charters have been arranged for government agencies engaged in special scientific endeavors.

Contact with corporate owners of 200- to 1,600-grt seiners can be arranged through the American Tunaboat Association; owners of 50- to 199-grt seiners can be contacted through the Fisherman's Cooperative Association. Baitboat owners can be contacted through the Western Fishboat Owner's Association.

Vessel Availability

Tuna vessels fish five main areas. In the eastern Pacific Ocean, the 200- to 1,600-grt steel-hulled vessels fish the entire range of the eastern Pacific Yellowfin Tuna Regulation Area, particularly from January through June. From May through December, vessels over 500 grt fish beyond this area to the waters near Hawaii, that is, from the equator to 20 degrees north latitude. The baitboats and smaller purse seine vessels fish off Mexico. The most important ports are San Diego and San Pedro, California.

TABLE 8-1 Numbers of Larger U.S.-Flag Fishing Vessels by Gross Tonnage and Region of Home Port

Gross Register Tonnage (grt)	Region of Home Port of Registry					
	West Coast	Gulf Coast & Florida	East Coast (except Florida)	Islands	Inland States	Totals
50 - 199	1,172	2,782	1,182	21	8	5,165
200 - 299	36	25	42	0	1	104
300 - 399	101	63	43	21	3	231
1,000 - 1,600	23	0	1	14	0	38 a/
Totals	1,332	2,870	1,268	56	12	5,538

a/ The Coast Guard Data Bank showed 40 vessels in this category. However, data from the American Tunaboat *Association showed that 2 of these had been sold to a foreign-flag operator and 1 had been sunk;* and that another vessel, the MONTANA (O/N 588 687), which had entered the U.S.-flag tuna fleet in 1977, was not listed in the Coast Guard printout.

In an effort to expand tuna fishing into the central, western, and southern Pacific Ocean, negotiations were begun late in 1977 to establish a temporary cold-storage transshipment facility at Midway to service Albacore tuna vessels. This new facility will supplement the transshipment facilities now located at Palau and Guam. Tuna canneries servicing the vessels in the central, western, and southern Pacific are located in Honolulu, Hawaii, and Pago Pago, American Samoa. Whangarei, New Zealand, is also an important port. Vessels operate off New Zealand from December through March, and in other areas of the central and western Pacific from April to November.

At least 35 U.S. tuna vessels consistently unload in Puerto Rico. From January through June, they fish the eastern Pacific and then proceed from Panama to Puerto Rico. Recently, a few have fished in the Caribbean during this passage. After June, most of these vessels cross to the eastern Atlantic and fish off western Africa between Monrovia, Liberia, and Angola. During November and December, they usually return to Puerto Rico or to the shipyards in Florida or California. The most important ports serving the Puerto Rican tuna vessels are Mayaguez and Ponce, Puerto Rico, and Jacksonville, Florida. Many seiners also can be found in the Panama Canal Zone.

During recent years, the northwestern Atlantic has been attracting fewer vessels. Much of the fleet has been forced away because of government regulations restricting the catch of Bluefin tuna. At present, a group of 4 or 5 50- to 200-grt seiners operate in this area from June through September.

As noted, the eastern Atlantic is fished from June through November by many of the same vessels that fish the eastern Pacific during the earlier months of the year. At least 18 to 20 vessels can be found in these waters during the season. Over the past few years, several vessels have fished these waters exclusively. Tema, Ghana, is the most important port.

Normally, tuna vessels are at sea 220 to 250 days a year. The vessels typically are provisioned for 60- to 80-day fishing trips, depending on vessel size. Therefore, tuna seiners and baitboats must have a substantial capability to maintain themselves at sea. There is a machine shop onboard each vessel to enhance this capability. It is considered important to have spare parts available; the general approach is to have "two of everything."

As most companies do not operate a large number of vessels and as the industry is highly competitive, government chartering of any vessels required to meet national defense needs would be preferable to a pooling arrangement.

Manning Considerations

The largest tuna vessels carry a crew of 19; the smallest, a crew of 6. Key personnel on the larger vessels include the Master, Fish Captain, Mate, Chief Engineer, Deck Boss, Assistant Engineer, Helicopter Pilot, and Helicopter Machinist. Since fishing trips average 60 to 80 days, these personnel must be highly skilled, experienced, and self-sufficient.

Training usually occurs on the job. However, there is an Engineers' School in San Diego, California, operated through a Community City College with partial funding from the tuna industry. There is also a Fisherman's School in San Pedro, California, but very few of its students enter the tuna industry.

Tuna seiners that operate from California ports usually are crewed by U.S. citizens or resident aliens. In contrast, almost all vessels operating from Puerto Rico or other U.S. ports outside the continental United States have a majority of fishermen who are non-resident aliens, although key positions usually are held by U.S. citizens.

Crew availability for mobilization during peacetime would require special arrangements for paying the crews, because the entire ship's company traditionally is paid on a share-of-the-tonnage basis, i.e., no fish--no pay.

Vessel Description

Tuna vessels can be divided into two groups characterized by type of operation. Baitboats use poles and line. This is clearly more sporting than purse seining; however, the time required at sea to land a similar sized catch is greater. Baitboats range from 15 to 34 m (50 to 111 ft) in overall length and from 3.3 to 6.7 m (11 to 22 ft) in beam. Most are of wood construction and built before 1960. The newer boats are of steel, wood, or fiberglass, depending on the length. Main propulsion is diesel with 90 to 450 kW (125 to 600 bhp). Maximum speeds are 12 to 14 knots and cruising range is 1,200 to 8,000 nmi. The baitboats over 24 m (80 ft) long are equipped with radar; all baitboats have VHF radio and basic navigation gear.

In terms of vessel size and fish production, the purse seine technique dominates the tuna fleet. This method of fishing is essentially seining with large nets. Seiners cruise to areas where schools of fish have been reported. One or two observers are stationed in a crow's nest supported about 15 m (50 ft) above the main deck by a mast, which also bears the load from the main boom. Boom design allows for loads up to 13 tons at a radius of 19 m (62 ft) on the 76-m (250-ft) class of tuna seiners. Although tuna vessels range from 200 to 1,600 grt, 70 percent are between 300 and 1,000 grt. These vessels range from 35 to 60 m (114 to 196 ft) in length with 800 to 2,100 kW (1,100 to 2,800 bhp). They cruise at 13 to 16 knots during fishing search and travel; during fishing, they drag nets at 3 to 5 knots. Tuna seiners between 35 and 79 m (114 and 258 ft) long carry sufficient fuel to cross oceans in search of fish and can carry back 500 to 1,600 metric tons of frozen tuna. Fish is carried in multiple holds lined with refrigeration coils. Electronics are sophisticated for long-range navigation and mid-ocean communication. Seiners accommodate 12 to 19 crew members and carry food stores to last about 60 to 80 days at sea.

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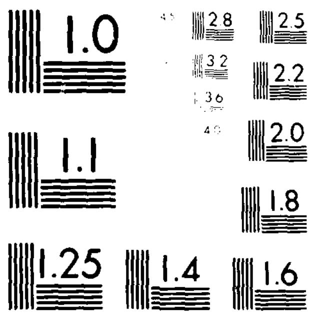

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MENHADEN VESSELS

Industry Description

When computed on a poundage basis, the menhaden sector of the industry produces from 35 to nearly 50 percent of the total annual U.S. fish catch. Although the value of this non-edible fish is low, the volume of the catch makes menhaden an important element in the total fishing industry.

There are two separate and distinct areas for menhaden fishing--the Gulf and the North Atlantic. The fisheries differ in size of vessels, fishing seasons, and, to a lesser degree, operating practices. The Gulf fleet is owned entirely by 5 companies, which also own the 11 factories that process the entire catch. The New England vessels typically are owned by individals who also serve as captains. The balance of the North Atlantic fleet is owned by a mixture of companies and individuals.

Vessel operation is closely tied to processing capability ashore. As a result, vessels frequently are owned by processing companies. There are commercial substitute products for the meal and oil derived from menhaden; however, as a measure of the industry's economic importance, it employs over 1,000 persons at sea. The industry is stable in size and financially healthy.

Vessel Availability

The Gulf sector consists of over 90 vessels in the 36- to 61-m (120- to 200-ft) range. Table 8-2 gives the major Gulf sector owner-operators and the number of vessels owned by each.

The North Atlantic sector consists of 60 vessels in the 24- to 61-m (80- to 200-ft) range, located approximately as follows: 5 in New Jersey; 25 in Virginia; 12 from North Carolina to Florida; and 18 of 24 to 36 m (80 to 120 ft) in New England. These last are multi-purpose vessels, engaged in trawling in the winter and menhaden fishing in the

TABLE 8-2 Numbers of Menhaden Vessels by Major Gulf Coast Owner-Operators

Owner-Operator	Number of Vessels
Zapata Corp.	41
Standard Products Co., Inc.	26
Sea Coast Products, Inc.	23
New Smith Meal Co., Inc.	17
Petrov Fisheries, Inc.	6
Total	113

summer. Owner-operators in the North Atlantic sector can be identified by contacting the industry associations listed in Appendix B.

The Gulf fleet is home-ported at small harbors between Cameron, Louisiana, and Moss Point, Mississippi. Fishing is conducted from Western Texas to Apalachicola, Florida, and ranges from close inshore to 20 nmi offshore.

On the Atlantic, the fishing areas are from the northeastern extremity of Maine to northern Florida. Fishing is normally confined to the coastal zone within 20 nmi of shore. Operations predominate in estuaries, such as Chesapeake Bay and Long Island Sound. Base ports are located throughout the Atlantic range.

In the Gulf, the fishing season is controlled by state law and falls between mid-April and mid-October. Vessels are inactive the rest of the year. The Virginia season, also controlled by state law, runs from mid-May to late November. Elsewhere, other than in Virginia, the season follows fish availability. In New England, fishing is carried out from May to mid-October. In the balance of the North Atlantic region, fishing occurs throughout the year, with a seasonal peak between mid-April and the end of January.

Fishing techniques are similar throughout the industry. Vessels are designed to catch menhaden by the standard practice of using nets set by small boats. The catch is held in refrigeration in on-board tanks during the usual 1- to 3-day voyages. The fish are then pumped ashore for processing into meal and oil. It is common industry practice to use owned or chartered spotter planes, equipped with long-range fuel tanks and marine radios, in the dawn-to-dusk search for menhaden schools.

Menhaden vessels have a low capability for self-sustained operations away from their logistics base. Routine repair and maintenance functions are performed by night crews onshore. Major engine and hull work is performed at local available shipyards.

The vessels have neither machine shops nor normal spare parts inventories. However, main engines and auxiliary machinery are relatively simple, and logistic support requirements are uncomplicated, at least for the short voyages normal to their operations.

Navigation and communication equipment is limited, and, therefore, these vessels usually are not capable of long-distance operation.

In normal peacetime conditions, all menhaden vessels are readily available, being no more than one day's sailing from their processing factory base and in contact by radio communication.

They serve an important but non-critical economic function in the civilian economy. They would be available as needed for emergency service; however, their use could cause local economic disruption at processing factories. The government used menhaden vessels as patrol and transport craft during World War II.

Manning Considerations

In the Gulf, the normal voyage is 2 days. Fishing is conducted only during the day. Vessels arrive back at the dock by midnight. In the North Atlantic, 1 day is the usual period away from the dock, but voyages can last as long as 3 days.

Menhaden vessels normally carry a crew of 17 for vessel operation and fishing. Accommodations are spartan. All training is done onboard, as it is in other fisheries. No other special training is required. Experienced menhaden officers and crew have basic vessel and machinery operating skills and fishing skills. Usually, crew members do not have vessel or equipment maintenance qualifications.

Vessel Description

Menhaden vessels in both the Gulf and Atlantic fleets are basically similar in arrangement, although there are wide ranges in size and power. Vessels in the Gulf, for example, range from 32 to 59 m (105 to 194 ft) with their two or four diesels developing 300 to 1,350 kW (400 to 1,800 bhp). Most were built between 1946 and 1977. The more recent vessels, such as those built in 1967, are 49.68 m (163 ft) long and have 1,065 kW (1,430 bhp). Atlantic boats are similar in characteristics; the typical boat is 50.60 m (166 ft) long and has 1,340 kW (1,800 bhp). However, with only a few exceptions, Atlantic vessels date from the 1940s and 1950s with recent repowering. Fish tank capacities are 100 to 140 cu m (3,500 to 5,000 cu ft).

The boats are highly maneuverable, have a maximum speed of 12 to 15 knots, and are shallow-draft for close inshore fishing. They are not considered highly seaworthy.

KING CRAB VESSELS

Industry Description

The king crab fishery is the fastest growing sector of the U.S. fishing industry. Located primarily in Alaskan waters, the catch has grown from approximately 13,600 metric tons (30 million lb) in 1972 to about 45,000 metric tons (nearly 100 million lb) in 1978. The fishing season, which is in the fall, varies each year according to quotas and the catch. The king crab fleet, numbering some 500 vessels and increasing, operates off-season in groundfishing, especially in the northern Pacific, and in the growing snow crab fishery. There are three king crab areas: the Bering Sea, the Kodiac region, and southeast Alaska.

During 1978, the catch was nearly 41,000 metric tons (90 million lb) in the Bering Sea, 4,500 metric tons (10 million lb) in the Kodiac region, and 700 metric tons (1.5 million lb) in the southeastern fisheries near the Alaskan panhandle. It should be noted that nearly 41,000 metric tons (90 million lb) were caught in the Kodiac region as recently as 1968. The precipitous decline in that area is attributed to over-fishing, and strict management is expected to increase the catch in future years.

Each owner sells the catch from each voyage to processing companies at the prevailing market price. Some stability in base prices results from negotiations between the processors and the two owner-operator associations. However, actual prices vary with supply and demand and with the quality of the catch, which varies seasonally.

The total value of the 1978 catch to the fishing industry was approximately $125 million. This figure does not include the value added by processing, transportation, and marketing.

In summary, the industry is healthy; demand is increasing; and, as a result, the fleet is growing rapidly. Because the yearly catch is limited to prevent the over-fishing that occurred in the past, prices are expected to increase. At present, there is an oversupply of vessels, and some vessels are finding occupation in other fisheries during part of the season.

Vessel Availability

As previously described, the king crab industry is divided into three operational regions. Vessels tend to work in one region and deliver their catch to processors in that region, although some crossover may occur to secure better prices. The largest area, the Bering Sea, is fished by approximately 150 modern, steel-hulled vessels, ranging in size from 27 to 52 m (90 to 170 ft), and by about 5 older, wooden boats, typically 17.68 m (58 ft) long. The Kodiac region is fished by approximately 195 of the older, smaller, wooden craft and 90 of the modern, steel vessels. All 60 vessels that fish the southeastern Alaska waters are older, wooden boats.

The number of vessels in the king crab fleet is increasing rapidly. During 1978, 35 to 40 vessels joined the fleet. An additional 50 vessels are expected during 1979. However, these additions may be offset, in part, by the retirement of older, wooden craft.

In almost all cases, king crab fishing boats are owned by individuals or by small partnerships whose members may have interests in several vessels. Usually, the skipper is the sole owner or one of the partners. Crab processing companies have financial interests in only a small number of the boats.

Washington and Alaskan ports are the home bases for most vessels. Because ship repair facilities in Alaska are limited, major hull and machinery repairs and overhauls are performed in the Puget Sound area shipyards. Crew members perform minor maintenance. Limited maintenance and repairs are performed in Alaskan shipyards. For example, using the 4.6- to 6.1-m (15- to 20-ft) tidal range in Alaska, bottom cleaning of vessels is performed by drydocking them on timber bridgeworks at high tide; this leaves the vessels' bottoms exposed for work at low tide.

Equipment logistic support requirements are not complicated. Vessels are equipped with proven diesel and hydraulic gear. Electronic communication and navigation equipment is modern but unsophisticated.

In general, these vessels are highly self-sufficient. They fish in relatively primitive areas, which are known for bad weather, including both high winds and fog. In addition, they operate for extended periods of time at relatively great distance from their main bases for major repairs. As a result, they could be valuable in emergencies in remote areas.

Since a surplus of vessels is a likelihood in the near future, it is expected that government use of selected vessels would not cause severe economic disruptions to the industry. During World War II, many crab

and other fishing vessels from the northwest coast served as personnel and supply craft among the Pacific islands.

Manning Considerations

Voyage lengths range from several days (for small craft working close to the processing plants) up to 3 weeks. The vessels attempt to stay at sea until full. Thus, voyage time depends on the abundance of crabs, the size of the vessel, the size of the crew, and the transit distance between the processing plant and the crab grounds. In 1978, 6 to 8 days was an average voyage length in the Bering Sea fishery, and 10 to 14 days was typical in the Kodiac region.

Fishing for king crab requires 3 men on deck and 1 in the pilot house. Therefore, the smaller wooden boats carry crews of 4 men. The newer, larger, steel vessels typically have 6- or 7-man crews, which allows the boats to work around the clock.

There is no formal training for the crews in the king crab fleet. On-the-job training is the norm, as it is in other fisheries. The vessels are of U.S. ownership, registry, and manning.

Vessel Description

Although king crab vessels range from 18 to 52 m (58 to 170 ft) in length and from 5.5 to 12.2 m (18 to 40 ft) in breadth, the king crab fishing fleet consists of two distinct types of vessels. The smaller boats, 18 to 26 m (58 to 85 ft) long, are older and generally of wooden construction. These are being made obsolete by new steel crabbers that carry up to six times as much live crab and have the cruising range and stability to cope with Alaskan waters. The modern steel vessels average between 27 and 34 m (90 and 110 ft) in length, with some as long as 40 m (130 ft) or even 52 m (170 ft). Main, auxiliary, and compressor engines are diesel.

The wooden craft, numbering approximately 260, are typically 17.68 m (58 ft) long with a beam of 5.5 to 5.8 m (18 to 19 ft) and a draft of 2.1 to 2.5 m (7 to 8 ft) when loaded. Their single diesel engines can develop 185 to 225 kW (250 to 300 bhp). While they usually carry a crew of 4 men when crabbing, the vessels have 7 or 8 berths to accommodate the larger crews required for salmon fishing in the off-season. These vessels can carry 45 metric tons (100,000 lb) of live shellfish at speeds of 8 to 10 knots.

All 240 of the newer steel vessels--nearly half the king crab fleet--have been built since 1967. The earlier vessels are powered by single diesels that develop 520 to 600 kW (700 to 800 bhp); the larger, newer vessels, over 38 m (125 ft) in length, are twin-screw, driven by 750 to 970 kW (1,000 to 1,300 bhp). A beam of 8.8 m (29 ft) is typical for the popular 32.9-m (108-ft) class. A 3.7- to 4.0-m (12- to 13-ft) loaded draft is normal. Speeds are in the 11- to 14-knot range. While they carry crews of 6 to 9 for round-the-clock crabbing, these vessels have up to 12 berths for the salmon season when more hands are required. They can carry up to 300 metric tons (660,000 lb) of live crab.

Because the crabbing procedure requires that the boat position itself over the crab pot to haul it out, the newer vessels usually have bow thrusters or steerable Kort nozzles for maneuverability and controllable-pitch propellers for effective salmon trawling in the off-season.

Navigation equipment must be sophisticated enough to locate the owners' crab pots with pinpoint accuracy, regardless of weather. The complete electronics outfit usually includes sonar; fathometer; autopilot; gyro compass; one or more radar sets; LORAN A and, in some cases, LORAN C; and three or more radios, SSB, VHF, and CB.

To provide a large clear deck space for working the crab pots, the vessels are arranged with pilot house and accommodations forward. On a 36.6-m (120-ft) vessel, up to 24.4 m (80 ft) may be deck space. The weather decks are overlaid with ribbed, wooden decking for better drainage. Circulating salt water systems in the crab tanks keep the catch alive until arrival at the processing plant. Many of the crabbers that trawl off-season for salmon are fitted with hydraulic winches and power blocks capable of lifting 2 to 3 tons. Hydraulic cranes, fitted on decks of steel crabbers, can lift 8 to 11 tons at boom lengths of 3 to 15 m (10 to 50 ft).

The maximum cruising range of the vessels (normally 1,000 to 2,000 nmi at full speed) usually is not tested because of the slow speeds (3 to 4 knots) required during the fishing operation. However, modern 36.6-m (120-ft) craft, which number about 15, have a 340-cu m (90,000-gal) fuel capacity, which would provide a range of approximately 17,000 nmi at fishing speed.

All of these vessels, particularly the newer ones, are highly seaworthy. Their ample beams and hard chines make stable work platforms. Some have reportedly been able to conduct operations in winds up to 60 knots.

TRAWLERS AND GROUNDFISHING VESSELS

Industry Description

Trawlers and groundfishing vessels may be found in New England, off the Pacific Coast, and in the Bering Sea. At present, a number of vessels engaged in king crab fishing in the northern Pacific also spend part of their season groundfishing. Since these vessels were reviewed in the previous section, this section will discuss only the New England trawler and groundfishing vessels.

In 1974, there were 1,245 vessels totaling 75,269 grt in the New England trawler and scallop fleets, including 14 vessels of 200 or more grt. These vessels operate from at least 6 major ports, as well as a number of smaller ports. Gloucester and New Bedford, Massachusetts, contain the largest number of vessels with 125 to 150 each. Approximately 100 vessels operate from Narragansett, Rhode Island, and 10 to 15 operate from Boston. New construction continues brisk, and the fleet is expanding.

All classes of vessels are designed for open-ocean operation and generally contain a complete electronics outfit for navigation and

communication. Normally, the boats are documented but uninspected. However, vessels over 38.10 m (125 ft) in length are now being classed by ABS and require Coast Guard inspection.

The commercial arrangements used in each of the major ports vary. In Gloucester, the individual owner-operators sell their catches directly to fish houses. Prices vary according to supply and demand. Crews are paid by a share of the catch; generally 60 percent of the value of the catch belongs to the owner-operator and 40 percent is divided among the crew.

In contrast, there is a fisherman's union in New Bedford, as well as a management association, known as the Seafood Producers Association. Contracts negotiated between the union and the association establish the proportion of the catch to be allocated to the crew, the maximum time the vessel will remain at sea, and the number of crew that will be used to man vessels of various sizes. There is also a Mutual Fund for fishermen that provides disability insurance, unemployment compensation, and pensions. Catches are sold at auction with individual processors bidding competitively. Prices vary on a daily basis.

In Narragansett, the individual owner-operators have established the Point Judith Fishermen's Cooperative. The cooperative owns a processing plant. Rates for processing are established by the cooperative on a species-by-species basis. The processing plant also sells fuel and ice, and underwrites insurance. At the end of each year, the profits from the plant are distributed among the members of the cooperative.

In Boston, there is a fisherman's union. The union contract with the Boston Fisheries Association stipulates time at sea, number of crew, and crew's share of the catch. No fisherman's mutual fund has been established, however. Owner-operators sell their catches to processors at auction.

Vessel Availability

Each of the major ports has an owner-operator association or cooperative. There is also a New England Fisheries Steering Committee (see Appendix B) which coordinates the various associations on matters of industry-wide significance. Individual owner-operators can be contacted through the associations. Associations not listed in the appendix can be identified through the New England Fisheries Steering Committee.

Logistically, these vessels have fuel capacities that allow for a range of 1,000 to 3,000 nmi, depending on vessel size, horsepower, and the speed at which the vessel is operated. However, the vessels do not have equipment or space for making repairs at sea. During normal operations, the largest trawlers remain at sea no longer than 3 to 6 weeks, and effect all repairs in port. Home ports are well equipped with spare parts and trained artificers.

As discussed in the preceding section, the commercial arrangements in the groundfisheries vary according to port. The size of the largest fleet in any single port (approximately 150 vessels) restricts the number of vessels that could be requisitioned without producing serious

negative economic consequences for owner-operators, crews, and processing plants.

Nevertheless, during World War II, the government took over 50 vessels, or 10 percent of the trawler fleet. These vessels accounted for nearly 20 percent of the fisheries' capacity. They were the newest seafood boats, all-steel, between 38 and 43 m (125 and 140 ft) in length, and all built between 1936 and 1939. The military used the vessels primarily as convoy escorts because of their excellent seakeeping characteristics, high freeboard, and reliable equipment. The U.S. Navy mounted 2 3-inch, 50-caliber guns in open mounts on deck and fixed ballast below for greater stability. As many as 10 or 12 vessels were successfully employed in war patrol work ranging all the way to Greenland and in search and rescue work by the U.S. Coast Guard.

Those vessels that had been requisitioned were immediately replaced by previously deactivated wooden-hulled boats, so that the commercial impact on the industry ultimately was minimized. In addition, the war effort spurred a reactivation of small shipyards that had been shut down due to lack of work.

Owner-operator associations are in the best position to advise on the availability of vessels and the best means of softening the potential negative economic consequences of removing vessels from their normal occupations. The experience gained during World War II, however, indicates that these vessels could be of value to the military.

Manning Considerations

The smaller, 20-m (65-ft) vessels carry crews of 6 to 8 men. The larger, 27- to 41-m (89- to 135-ft) vessels carry 11 to 13 men, depending on union contract stipulations.

The key personnel on each vessel are the Captain and the Engineer. The Engineer is not licensed and generally is trained on the job, as are the rest of the crew. Most crew members are U.S. citizens. Since crews are paid on a share-of-the-catch basis, their availability for military missions would have to be negotiated.

Vessel Description

As previously noted, all trawlers and groundfishing vessels are designed for open-sea operation. Trawlers range in length from 20 to 41 m (65 ft to 135 ft). Of the U.S. trawlers under 26 m (85 ft) in overall length, all those built before World War II and about half of those built since are wooden, the rest being steel-hulled. Those over 26 m (85 ft) long are generally steel-hulled with wooden or aluminum superstructures. Those over 38.10 m (125 ft) in length (of which there are only 15 or 20) are classed by the ABS and inspected by the Coast Guard.

Groundfish trawling consists of dragging a net at speeds of 1 to 3 knots. The catch is seldom foodfish; more typically, it is rendered for the oil and minerals in the fish. Processing is done at sea. Trawlers over 37 m (120 ft) in length have the capacity to fish for 3 to 6 weeks at a time.

The vessels may be eastern or western rigged. Eastern-rig boats have machinery space, bridge, and officers' accommodations aft, crew accommodations forward, and the fish-hold amidships, with the operation of the nets taking place over the side. Western-rig boats are designed with machinery space, accommodations, and bridge forward, while the fish-hold is amidships, and operation usually takes place over the stern. About 70 percent of U.S. trawlers are side-trawlers. Stern-trawlers require a stern ramp built into the hull. All trawlers have booms or cranes and wide, mechanically driven, drums to handle the large nets.

Proximity to land, frequent fog, and heavy traffic are among the factors that necessitate sophisticated navigation and communication equipment on trawlers. Typically, they carry radar, LORAN, depth finders, and extensive communication equipment.

Diesel engines are used exclusively for the propulsion and refrigerant compressors on trawlers of all sizes. Since the diesels are of U.S. manufacture (generally Caterpillar or General Motors), spare parts are readily accessible and service is available at all U.S. ports.

The U.S. trawlers are small in comparison with their foreign-flag competitors. The largest are the European and Soviet vessels that fish the waters off Newfoundland. To make their longer voyages profitable, they must carry home larger cargoes of processed groundfish. These modern trans-ocean trawlers normally exceed 61 m (200 ft), while some exceed 152 m (500 ft) in overall length.

SHRIMP BOATS

Industry Description

Although considerable shrimping takes place off all U.S. coasts, the U.S. shrimp fleets are concentrated mainly in Texas, Louisiana, and Florida. The great majority of boats are under 20 m (65 ft) overall and are family-owned and -operated. These are short-range vessels, and their seaworthiness characteristics preclude ocean operation outside of the Gulf of Mexico. Within the Gulf, however, they are capable of remaining at sea for up to 90 days.

In 1974, Fishery Statistics of the United States identified 5,115 vessels totaling 287,107 grt engaged in the shrimp fisheries. Although 1,294 vessels were in the range of 100-199 grt, none was over 200 grt. The vessels are classed as undocumented vessels and, therefore, are not subject to Coast Guard inspection.

Individual owners-operators of shrimp boats sell their catches to fish houses. Prices fluctuate daily according to supply and demand. Some fish houses have graders on their docks. The graders sort the shrimp, and the price of the catch is determined by the quantity of shrimp of various sizes, larger shrimp demanding higher prices. Fish houses without graders simply negotiate with the operator. At Aransas Pass, Texas, there is a fisherman's cooperative that purchases shrimp. Credit is issued to the owner-operator. The credits may be used to purchase supplies or fuel. At the end of the year, profits are distributed among owner-operators with outstanding credits.

Since most vessels are individually owned and operated, the most efficient means of contacting them is through the various owner-operator associations. In addition, the National Shrimp Congress, located in Washington, can be contacted for further information about other shrimp fisheries associations.

Vessel Availability

More than 20 ports on the Gulf of Mexico have shrimp fleets. The largest is Brownsville, Texas, with a fleet of over 400 vessels. Fleets of 200 to 300 vessels may be found in Mobile, Alabama; Tampa, Florida; Houma, Louisiana; and Corpus Christi and Galveston, Texas. Biloxi, Mississippi, and Key West, Florida, each have fleets of 100 to 200 vessels, as does Jacksonville on the Atlantic coast of Florida.

The larger, long-range shrimp boats are fully outfitted with refrigerated holds and sophisticated electronics. They can stay at sea up to 90 days and range as far south as the eastern coast of South America. Minor repairs can be made at sea, and some spare parts usually are carried on board. However, most repairs are done in port. Spare parts and service personnel are readily available in most Gulf Coast ports.

Because most shrimp boats are owned and operated by individuals, chartering would be the preferred mode of government acquisition. If chartering were limited to a small portion of the Gulf shrimp fleet, the large number of vessels in the fleet probably would cushion the impact on the onshore enterprises that depend on this industry.

Manning Considerations

Crews on Gulf of Mexico shrimp boats generally consist of 3 or 4 men. The Captain usually doubles as the vessel's Engineer. There are a Mate and one or two additional crew members. Training is generally on-the-job, and most crew members are U.S. citizens.

Vessel Description

Shrimp boats range in length from 20 to 29 m (65 to 95 ft). Construction is of wood, steel, fiberglass, or combinations of these. Deck house dimensions range from 6 to 12 m (20 to 40 ft) long by 3 to 6 m (10 to 20 ft) wide, with accommodations for 3 to 9 persons.

Short-range shrimpers operate inside the Gulf of Mexico for 1 to 2 weeks per outing, depending on the size of catches. The large boats, which may travel as far as Brazil, have endurances up to 90 days, ranges of 8,000 to 16,000 nmi, and good seakeeping characteristics. Refrigeration plants are built into boats over 24 m (80 ft) long; the smaller vessels chill their catches with ice. Hold space varies from 85 to 115 cu m (3,000 to 4,000 cu ft).

All shrimp boats have outriggers that swing down to the horizontal position to widen the dragging area. With a boom length of 12 to 15 m

(40 to 50 ft) on either side, total dragging width is 30 to 38 m (100 to 125 ft). The outriggers are attached to the base of a mast that also supports a boom with lifting capacity of 5 to 6 tons. Trawl winches for reeling in nets are situated on deck. The winches have multiple drums with maximum capacities of 10 to 20 tons at rated speeds.

Propulsion and compressor engines are normally diesel. Main engine powers range from 225 to 375 kW (300 to 500 bhp) for vessels under 24 m (80 ft) long and from 300 to 560 kW (400 to 750 bhp) for larger boats. Steel shrimpers are powered by the larger engines, usually of 370 kW (500 bhp) or more. Shrimpers operate (fish) at speeds of 2 to 5 knots, but are capable of 11 to 13 knots. Since their engines are all of U.S. manufacture (Caterpillar or General Motors), spare parts are easily obtainable and most ports are equipped to service the engines.

The larger vessels have sophisticated navigation and communication equipment. Electronics are not generally sophisticated on Gulf shrimpers; the quality and extent of equipment is determined by the vessel's owner.

9

OTHER INDUSTRY SECTORS

This chapter provides information about seven additional types of vessels and craft: (a) Oceanographic Research Vessels, (b) Dredges, (c) Floating Drydocks, (d) Motor Yachts, (e) Ferries, (f) Marine Salvage Vessels, and (g) Advanced Marine Vehicles (Air Cushion Vehicles, Surface Effect Ships, and Hydrofoils). These vessels vary widely in characteristics and operational capabilities, even within type, and are of diverse ownership. However, they are included in this report because, individually, they may offer the particular capabilities needed to meet a specific set of operational requirements in an emergency or mobilization.

OCEANOGRAPHIC RESEARCH VESSELS

Industry Description

The entire oceanographic research fleet is composed of U.S.-flag vessels. Title to approximately 50 percent of the vessels rests with the federal government, specifically, the U.S. Navy and the National Science Foundation (NSF). Regardless of the titleholder, however, ship operations and direct management are under the purview of the operating institution. The fleet comprises four major divisions: (a) the U.S. Navy oceanographic fleet (which, like other naval vessels, is outside the scope of this report); (b) the National Oceanic and Atmospheric Administration (NOAA) ocean survey and marine fisheries fleets; (c) the University-National Oceanographic Laboratory System (UNOLS) vessels; and (d) miscellaneous oceanographic vessels operated by the private sector. In addition, the NSF and the U.S. Geological Survey (USGS) operate one vessel each.

In treating the "miscellaneous private" category, (d) above, this chapter excludes drillships and other offshore oil industry vessels (see Chapters 6 and 7); and the few ocean mining vessels, and submersibles, neither of which is included in this report. A few so-called research vessels are operated by the private sector. These are difficult to

catalog because of the local nature of their operations and the lack of a central clearinghouse for information. Some are engaged in single-owner, single-vessel operations; others are owned by corporations with several mission-specific vessels for charter.

Unlike vessels designed for a single specific task, such as a tanker or containership, most research vessels are designed for versatility and adaptability. Vessels of the NOAA fleet are generally more mission-specific than their academic counterparts in the UNOLS fleet. The mission of a NOAA vessel, for example, may be to carry out the charting program of the National Ocean Survey or the fisheries investigations of the National Marine Fisheries Service. The academic vessels, on the other hand, may be carrying out complex geological and geophysical investigations one week and biological studies the next.

The great quantity and variety of specialized gear, such as winches, required to carry out these divergent missions, together with the wide diversity in hulls among ocean research vessels, makes any attempt at classification somewhat arbitrary. Individual capabilities and limitations must be assessed when these vessels are considered for a specific mission. Research vessels have been assigned to the classes in Table 9-1 on the basis of length overall (LOA). Only the 95 vessels

TABLE 9-1 Numbers of U.S. Oceanographic Research Vessels by Length and Operator[a]

	Operator b/					
Length Overall (Ft)	NOAA	UNOLS	USGS	NSF	Misc. Private	Totals
250 and over	4	-	-	-	-	4
200 - 249	4	7	1	-	-	12
150 - 199	10	8	-	-	1	19
100 - 149	2	18	-	1	4	25
65 - 99	6	27	-	-	2	35
Subtotals	26	60	1	1	7	95
Under 65	-	<---------(Perhaps 50-60)-->				
Total						145-155

a/ Excludes the U.S. Navy oceanographic fleet; and drillships and other offshore oil industry vessels, ocean mining vessels, and submersibles.

b/ Key:

NOAA: National Oceanic and Atmospheric Administration

NSF: National Science Foundation

UNOLS: University-National Oceanographic Laboratory System

USGS: U.S. Geological Survey

Misc. Private: miscellaneous oceanographic vessels operated by the private sector

longer than 19.81 m (65 ft) are treated in the Vessel Characteristics forms (Appendix A).

NOAA Ocean Survey and Marine Fisheries Fleets

In 1978, the NOAA fleet comprised 26 vessels ranging in length from 20 to 92 m (65 to 303 ft), with displacements ranging from 91.5 metric tons (90 long tons) for the small, general-purpose ships, VIRGINIA KEY and SHENEHON, to 4,023 metric tons (3,960 long tons) for the deep-ocean research vessel OCEANOGRAPHER. All are government-owned and are operated by a single federal agency, NOAA. Their mission is to carry out NOAA's specific ocean-related research and surveys, such as fisheries research or ocean floor mapping. Since they are government-owned and -operated, they are assumed to be available in times of national need.

UNOLS Research Vessels

The UNOLS or academic oceanographic research vessels are a diverse assemblage of publicly and privately owned vessels that have taken on characteristics of a unified fleet through the cooperative association of operator institutions known as the University-National Oceanographic Laboratory System. This fleet may be subdivided into three groups: vessels operated by Member Institutions, those operated by Associate Member Institutions, and those operated by other institutions. The majority of the vessels that are 20 m (65 ft) or longer are operated by Member or Associate Member Institutions.

Vessels operated by UNOLS Member Institutions receive most of their operational funding directly from the federal government, with lesser amounts from state and local treasuries and industrial sources. There are about 30 vessels in the 20- to 75-m (65- to 245-ft) length range, with a total displacement of about 23,500 metric tons. About two thirds of these were originally designed and built for oceanography. The remainder are conversions.

Vessels operated by UNOLS Associate Member Institutions currently number about 28 and range in length from 15 to 56 m (50 to 185 ft). Operational funding is derived generally from various grants, private sources, and local state funds.

Vessels operated by other institutions or facilities are funded in the same general manner.

All three groups normally engage in the various disciplines of academic oceanography, including biology, chemistry, physical oceanography, submarine geology and geophysics, ocean engineering, and meteorology.

Miscellaneous Private Oceanographic Vessels

Excluding those segments of the commercial sector mentioned at the outset (i.e., drillships and other offshore oil industry vessels, ocean

mining vessels, and submersibles), there remains a group of privately owned vessels. They range from less than 20 m (65 ft) to approximately 30 m (100 ft) in length. Some are advertised as being available for charter from time to time. They number between 5 and 10 vessels at any one time.

Vessel Availability

The geographic distribution of the 95 vessels longer than 20 m (65 ft) is shown in Table 9-2. Areas of operation include all of the continental United States coast; Alaska, Hawaii, and the Great Lakes; and the high seas. Assuming diplomatic clearance, vessels larger than 46 m (150 ft) LOA may operate in coastal waters of foreign nations. One, NSF's HERO, operates in the Antarctic, supplying Palmer Station.

Vessels of the NOAA and UNOLS fleets generally carry normal engine spare parts and are equipped to make routine repairs to engines and deck machinery at sea. Fuel oil and lubricants are available in most U.S. ports and are arranged abroad by contract, either through a local ship's agent or a U.S. Navy facility. In their home ports, fully equipped machine shops provide additional support. Home ports also are equipped with radio facilities, usually including single sideband (SSB), and vessels at sea usually are contacted at least daily. The home ports for NOAA vessels are: Alaska (Auke Bay); Hawaiian Islands (Honolulu); West Coast (Seattle, Washington; San Diego, California); Gulf Coast (Pascagoula, Mississippi); East Coast (Miami, Florida; Sandy Hook, New Jersey; Woods Hole, Massachusetts); Great Lakes (Monroe, Michigan). The home ports of UNOLS vessels are listed with their operators in Appendix B.

Since all NOAA vessels and about half the UNOLS vessels are government-owned, they should be readily available in time of need. And since they rarely engage in commercial operations or charter agreements, their call-up would involve no apparent legal difficulties.

It should be noted that these vessels probably would be a poor choice for carrying cargo. Their deck space is severely obstructed by various winches; they have relatively small hatches, serving inadequate holds; and there are various A-frames or similar devices for leading wires over the sides. However, vessels of some of the larger institutions are accustomed to carrying explosives, and one or two have built-in magazines below decks. In addition, some of the smaller vessels could be useful for harbor or coastal patrol duties.

The economic impact of a call-up of ocean research vessels on the civilian sector would be minimal. The research vessels could continue to perform vital oceanographic research which, in time of national need, might become more mission-oriented. There is a presumed need for survey ships in a variety of possible emergency or mobilization situations. Examples of their use might include hydrographic survey and locating objectives on the sea floor. A number of research vessels have sonar bottom-profiling capabilities, onboard computer facilities, and sophisticated data transmission capabilities.

TABLE 9-2 Numbers of U.S. Oceanographic Research Vessels by Length and Region of Home Port[a]

	Region of Home Port								
Length Overall (Ft)	Alaska	Hawaiian Islands	U.S. West Coast	U.S. Gulf Coast	U.S. East Coast	Great Lakes	Puerto Rico	Bermuda	Totals
250 and Over	-	-	2	-	2	-	-	-	4
200 - 249	-	-	7	-	5	-	-	-	12
150 - 199	-	3	5	2	9	-	-	-	19
100 - 149	-	-	8	2	13	-	1	1	25
65 - 99	2	1	6	3	18	5	-	-	35
Totals	2	4	28	7	47	5	1	1	95

a/ Excludes vessels under 65 ft. in length. (See also Table 9-1, note a.)

Manning Considerations

The normal period of sea duty between port calls for vessels of the NOAA and UNOLS fleets ranges from 2 to 3 weeks for vessels over 61 m (200 ft), down to "day only" operations for those under 20 m (65 ft) LOA. Annual days at sea for a UNOLS vessel average between 220 and 260 days.

Annual utilization of vessels in the "miscellaneous private" sector is not known.

The NOAA vessels carry crews with the special skills required to carry out their missions: fisheries research and hydrographic surveys. Larger NOAA vessels carry small survey launches that run the actual traverses in coastal waters.

Crews of UNOLS vessels are especially adept at mooring in and retrieving instruments from the deep sea. They also are skilled at winch operations, as much oceanographic gear is deployed on wire rope. Neither NOAA nor UNOLS vessels carry a medical doctor aboard; medication is dispensed by a designated officer. Crews of both fleets usually are U.S. citizens.

The skills and training levels of crew members for vessels in the "miscellaneous private" sector are varied. Specific information is not available, but the small numbers involved make these crews a low-priority manpower consideration.

Vessel Description

As shown in Table 9-1, vessels in the oceanographic research fleet range from under 20 m (65 ft) to over 76 m (250 ft) LOA. Propulsion is not standardized, although diesel-electric and diesel direct-drive are the most common systems. (Two of the larger vessels have cycloidal propulsion.) The average speed is 10 to 12 knots. Precision in navigation is routine.

Vessels measuring over 61 m (199 ft) LOA have open-ocean, worldwide oceanographic capabilities. Smaller vessels, particularly those less than 46 m (150 ft) LOA, are weather-limited and are employed in regional and coastal operations, usually within 100 nmi of the coast.

The large and medium-sized vessels (i.e., those over 45 m, or 149 ft, LOA) usually can perform standard oceanographic work in Sea States 3 to 5 (0.6- to 1.8-m, or 2- to 6-ft, waves); their degree of success is directly related to hull characteristics. Certain routine underway observations (e.g., gravity, magnetics, and precision bathymetry) can be performed in almost any sea state. However, data quality deteriorates with sea state, particularly bathymetric data (because air entrainment under the hull interferes with transducer operation). Because of varied hull designs, seakeeping capability varies widely. All hulls are steel, except two which are aluminum; one of these is a catamaran.

Research vessels often handle small, 1,828 × 1,828 × 2,438- or 1,828 × 2,438 × 3,657-mm (6×6×8- or 6×8×12-ft), vans, which usually are loaded by ship's gear and carried on deck. Some vans have utility connections and are used as portable laboratories. Deck space is at a premium and only 2 research vessels have helicopter platforms.

All 4 research ships over 76 m (250 ft) LOA are in the NOAA fleet. These vessels have open-ocean, worldwide capability for conducting oceanographic investigations.

There are 12 research ships with lengths ranging from 61 to 76 m (200 to 249 ft). Of these, 4 are operated by NOAA, 7 by UNOLS, and the remaining one by the USGS. These vessels, also, have open-ocean, worldwide oceanographic capability.

Of the 19 research ships with lengths between 46 and 61 m (150 and 199 ft), 10 are operated by NOAA, and 8 by UNOLS members or other academic institutions. Within the latter group are the 3 OCEANUS-class vessels built in 1975. The remaining vessel is from the private sector.

Within the 30- to 45-m (100- to 149-ft) length class, all 25 research boats range between 30 and 38 m (100 to 125 ft). Of these, 2 are operated by NOAA, 1 by the NSF, and 18 by UNOLS members. The remaining 4 are in the private sector. The majority are employed in coastal operations and generally operate within 100 nmi of the coast.

Of the 35 research boats with lengths between 20 and 30 m (65 to 99 ft), 6 are operated by NOAA, and 27 by UNOLS members or other academic institutions. The remaining 2 are in the private sector. More than two thirds of this class are conversions, and several of these are ex-Army T-boats. Most are used regionally and coastwise and are weather-limited; a large number make only trips of 1 to 3 days' duration. This class has a higher percentage of older vessels than do the other classes.

In the class under 20 m (65 ft) in length are the small day-boats. Some of these may be carried as survey launches on the larger NOAA vessels or operated regionally by academia. They are very weather-limited and generally do not remain out overnight. It is estimated that there are 50 to 60 of these boats, including outboard-powered craft. Probably most are conversions from pleasure craft, but a few specially designed craft may be included. (This length class is not included in the Vessel Characteristic forms, Appendix A.)

DREDGES

Industry Description

Dredging operations may be required to deepen, widen, or otherwise improve a port or waterway. Dredges also are used to assist in the salvage of ships and in the clearance of vessels or other obstructions from rivers, harbors, and channels. Many dredges are owned and operated by the mining industry and are used to recover materials ranging from sand to gold.

There are at least 12 different types of dredges, 10 of which are shown in Figure 9-1). (The suction dustpan and bucket backhoe types are not illustrated.) The most common and versatile is the cutter suction dredge, which has cutterheads that can be adapted to suit the bottom material of the work area. There are also many other suction dredges and floating grab or clamshell dredges. The grab or clamshell type can be constructed by outfitting any large rotating crane with a large bucket. Most dredges used in the mining industry are of either the

bucket type, for ore mining, or the various suction types, for mining aggregate, sand, or other construction materials.

The ABS Register lists 41 dredges; the World Dredging Directory lists 666, of which 601 are privately owned. A review of both listings indicates that there are 298 cutter suction dredges, 130 floating grab or clamshell dredges, and 74 other suction dredges of U.S. registry. In addition, there are hundreds of small, portable suction dredges, which can be readily mounted on barges to perform in special areas. While some dredges are self-propelled, the majority of U.S. dredges are not.

There are over 200 active dredging organizations in the United States. This total includes federal and state agencies, and port authorities. While commercial dredging organizations have built and are continuing to build some trailing suction hopper dredges, the Corps of Engineers presently owns almost all the dredges of this type. The Corps also owns most of the other suction hopper dredges. Ownership of all other types is more widespread among other agencies and the many commercial dredging companies. The latter include some of the larger tug-barge operators.

Table 9-3 lists major U.S. dredging companies and the total number of dredges owned by each. An "X" in any column indicates that the company owns at least one dredge of that type.

Dredges owned by mining companies are not listed in the table because most are located in mining areas, owned and operated by mining companies, and rarely moved from their stations. Commercial dredging companies own and operate their own equipment. Dredging contracts usually are negotiated directly between the parties involved.

Vessel Availability

Of the 7 owner-operators listed in Table 9-3 that have 9 or more dredges, 3 (C.F. Bean Corporation, Hendry Corporation, and T.L. James & Co., Inc.) are located on the Gulf Coast; 2 (Bohemia, Inc., Umpqua Division; and Western Pacific Dredging Corporation), on the West Coast; 1 (Norfolk Dredging Company), on the East Coast; and 1 (Great Lakes Dredge and Dock Company), on the Great Lakes.

Except for the trailing suction hoppers and the other suction hoppers, all dredges must be towed or lifted by barge to their destinations. Recent innovations in barge towing methods have made lifting by barge the less hazardous mode of sea transit. The very large barges in use today can transport an entire dredging facility, including the dredge, scows, smaller barges, tugs, and workboats.

Dredges generally require a nearby support base to house management offices, stock extra discharge pipe and cutter heads, and provide facilities capable of repairing extensively damaged equipment. Dredges themselves require periodic overhaul and drydocking. Usually, this is accomplished at the nearest shipyard facility capable of performing the work, although it may be done enroute to a new assignment in a shipyard that has more competitive prices. Dredges also require the normal support functions of fuel, food, fresh water, and spare parts. These are provided through commercial arrangements, which vary with the area of operation.

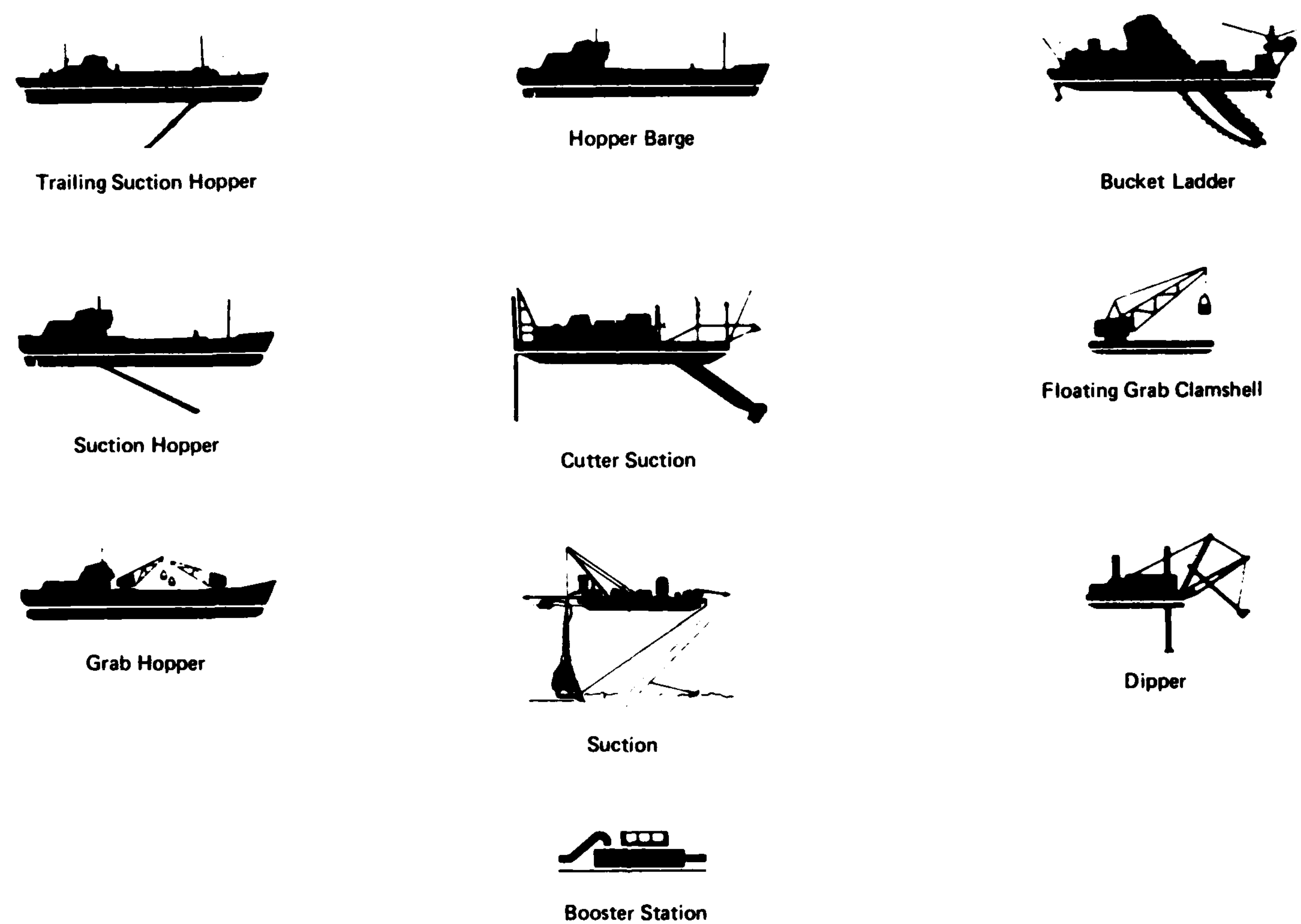

FIGURE 9-1 Dredge types

If dredges were required in large numbers in an emergency or mobilization, their removal from the civilian economy would impact the mining and water transportation industries. Their locations at any given time can best be obtained by direct contact with owners.

Manning Considerations

Most dredges are manned by experienced crews, which is a decided advantage in terms of logistic support. Unless the ranks were depleted by wartime drafts, there should be sufficient personnel already in the industry to continue operations. Because this is a highly specialized field with its own cadre of technicians, rapid expansion would be difficult. Most dredges have well-equipped machine shops and welding and burning facilities; and, in general, these capabilities increase with vessel size.

Vessel Description

Variations in dredge characteristics are virtually without limit. Nevertheless, there are recognized major types or classifications. Each type has been designed to function efficiently under certain conditions. Variations are necessary because the type of material to be dredged, sea conditions, and the desired dredging speed and materials handling speed all vary with differing operations.

Major Types of Dredges

Cutter Suction Dredges The basic cutter suction dredge consists of a barge constructed with wing tanks and compartments extending down both sides and a huge single center compartment that houses the dredge machinery. The wing compartments extend forward of the center compartment, forming a well (recessed in the hull) in which the ladder (the frame supporting the cutter head) hangs. The ladder is supported by trunions at the top, and raised or lowered to the desired dredging depth by a gantry crane built out over the well. The ladder supports the motor and shaft, which turn the cutter head at its lower end, and the suction pipe, which picks up the dredged material (spoil) churned by the cutter head and directs it through the pump to the discharge line.

The changeable cutter head makes this equipment best for "new" dredging, especially where a hard bottom is involved. The barges are usually fitted with spuds (legs) to assist in positioning and pivoting. Depending on the operation, accommodations will range from facilities for a day crew to full accommodations for round-the-clock operation with all hands living aboard for weeks on end.

Cutter suction dredges usually are classified by pump size and horsepower (indications of dredge volume) and by length of ladder (an indication of depth capability). Many of the portable mini-dredges are of this type. Cutter suction dredges range, in standard sizes, up to 762-mm (30-in.) suction-pipe diameter, but can be constructed much

TABLE 9-3 Numbers and Types of U.S.-Flag Dredges by Owner-Operator

Owner-Operator	Number of Dredges	Trailing Suction Hopper	Suction Hopper	Grab Hopper	Cutter Suction	Suction	Floating Grab or Clamshell	Dipper	Booster Station	Bucket Backhoe	Hopper Barge
Western Pacific Dredging Corp.	21				X	X					
Great Lakes Dredge and Dock Co.	20				X		X	X			
C. F. Bean Corp.	17				X		X		X		
Hendry Corporation	13				X		X		X		
Bohemia, Inc., Umpqua Division	10					X	X			X	X
T. L. James and Co., Inc.	10				X	X	X				
Norfolk Dredging Co.	9				X		X				
Construction Aggregates Corp.	8		X		X						
American Dredging Co.	7			X	X		X	X			
Parkhill-Goodloe Co., Inc.	7				X				X		
Potashnik Construction	7				X						
J. Ray McDermott and Co., Inc.	6						X				
Williams-McWilliams Co., Inc.	6				X						
Bultema Marine Transportation	5				X						
Dillingham Overseas Corporation	5				X				X		
Peter Kiewet	5	X			X		X				X
Smith-Rice Co.	5						X				X
Weeks Dredging and Contracting, Inc.	4						X				
Western Contracting Corp.	3				X				X		
E. I. DuPont De Nemours and Co., Inc.	2				X						
Total	170										

X - Indicates dredge types included in total for each owner-operator.

larger. Pump engine power requirements increase exponentially with pump or suction-pipe size: 185 kW (250 hp) for a 203-mm (8-in.) pump, 2,685 kW (3,600 hp) for a 457-mm (18-in.) pump, 9,700 kW (13,000 hp) for a 762-mm (30-in.) pump, and 20,150kW (27,000 hp) for a 1,067-mm (42-in.) pump.

<u>Suction Dredges</u> Suction dredges function solely by pump suction, although the end of the suction pipe may be fitted with blades, rakes, or scoops to disturb the bottom as the suction pipe is moved along it. Thus, their use is restricted to bottoms that are readily slurried, such as sand, mud, or silt that may have filled in a previously dredged channel. Some self-propelled suction dredges are also hopper dredges, i.e., the spoil is deposited in on-board hoppers to be dumped in another location; others may merely direct the spoil through a discharge pipe, to be carried away by an accommodating current. Many suction dredges are self-propelled. Most provide accommodations for a full live-aboard navigating and operating crew.

<u>Bucket Ladder Dredges</u> As the name implies, the bucket ladder dredge has a conveyor belt (or chain) with buckets mounted on the ladder. It is similar to a cutter suction dredge, in that the ladder is hinged and the end is raised or lowered to adjust the depth. This type of dredge is useful in relatively soft bottom and in heavier mud and clay. It is used extensively in mining operations as well as in channel and harbor maintenance. Depending on the particular use to which the dredge is put, the spoil may be dumped into a hopper for later transfer or pumped overboard through a discharge pipe.

<u>Grab or Clamshell Dredges</u> The grab or clamshell dredge is essentially a barge-mounted crane operating a clamshell bucket. Other bucket types may be used, depending upon the material being dredged. The spoil may be dumped into a hopper on the barge itself or into a separate unit. This type of dredge, while useful in most types of bottom, is especially well suited to bottoms that are littered with debris that would foul the removal apparatus of other types of dredges.

Many of these vessels are specially constructed for dredging operations, but their versatility for other uses (as crane barges) should not be overlooked. Also, a dredge of this type can be readily assembled by mounting a shore crane on a barge provided with a mooring system and a pad for the crane. However, because of considerations of barge seaworthiness, such an improvised rig would be limited as to the marine environment, especially sea conditions, in which it could operate. (A second limitation is that the materials and coatings used in shore crane construction are less corrosion-resistant than those used in cranes built for marine service.)

With specially designed scoops, a crane can cast a considerable distance from the dredge and draw the spoil to it, reducing the need for frequent barge movement. This dredge type is called a <u>dragline</u>.

<u>Dipper Dredges</u> This dredge is a classic steam shovel; it operates in the same manner, by scooping and dumping each bucketful into a hopper.

The bucket arm normally rotates to dump its load into an adjacent barge or hopper.

Although, in the past, this type of dredge was used for bottom-clearing, it is seldom used for such purposes today. It is more commonly used in mining operations where its slow speed is not critical. This type of dredge, also, may be improvised by mounting land excavation equipment on a suitably rigged barge.

Propulsion

Generally, only the suction dredges are self-propelled. The trailing arm suction dredge operates at a comparatively fast clip, dumping its spoil either into its own hopper or outside the channel through a discharge pipe swung out over the vessel's side on an arm.

Other types of dredges may have positioning thrusters or sea mules, but this is not usual. A sea mule is, in effect, a large outboard motor. In this application, it is semi-permanently mounted on the dredge, but can be removed and mounted on another vessel. Typically, its power is in the 450- to 600-kW (600- to 800-hp) range; some exceed 750 kW (1,000 hp). The precision of control of sea-mule systems varies. Some are radio-controlled, in the manner of those mounted on the bows of the lead barges of large inland river push-tow arrays.

Mooring Systems

Spuds For inland (smooth-water) operations, the most efficient mooring system is that of spuds. The spuds, mounted in wells or gates, are raised or lowered by hydraulic, pneumatic, or mechanical lifting apparatus. The dredge may be moved by pivoting the barge around one of the spuds, or, where the spuds can be pivoted from the vertical position, by "walking" the barge. The latter is accomplished by lowering the spuds with their ends forward; rotating the spuds, thus pulling the vessel forward; raising the spuds; then repeating the same procedure.

Anchors Anchor systems are less handy but are necessary for offshore operations where the sea motions generate forces that would be excessive for rigid spud legs. Multiple-anchor mooring systems are used for holding and positioning the dredge, and for swinging the suction head through its arc of operations. Shifting the anchors requires the assistance of a workboat or tug.

Combination Spuds and anchors are used in combination to provide for faster shifts of position; for pivoting the barge on the axis of a spud; or otherwise to aid in the operation, repositioning, and securing of the vessel.

Discharge Methods

Pipeline Often, the dredge spoil is discharged through a lengthy pipeline that floats on pontoons to a dredge spoil dump area. By adding sections, the pipeline may be extended to any reasonable length; and, by adding flexible joints, it may be curved to any configuration necessary to avoid obstructions or to minimize blockage of channels. Where channels are crossed by the pipeline, special removable sections must be used to allow the channel to be opened, and the pipeline must be equipped with the required lights and signals.

Hopper Discharge System The hopper may be part of a self-contained dredging unit or it may be a separate unit entirely. It is used to hold the spoil for subsequent transfer, either to a suitable dumping area or to a storage point when the spoil is being recovered for other use.

FLOATING DRYDOCKS

Industry Description

Floating drydocks are used to maintain and repair vessels and craft. During World War II, floating drydocks were used to supplement heavily damaged drydocking and crane facilities in captured European ports and to provide repair facilities in the central Pacific. Since World War II, the Navy has built no new drydocks. However, many drydocks are still owned by the federal government and are under the control of the Naval Facilities Engineering Command. Most government-owned floating drydocks are leased to operators in the private sector. All floating drydocks constructed since World War II have been built by the private sector. Almost all commercial drydocks are owner-operated on the basis of fees charged for maintenance and repair work.

Data from the ABS Record and the Marine Directory indicate that there are 70 floating drydocks over 91.44 m (300 ft) long in the continental United States and 1 in the Hawaiian Islands.

Vessel Availability

The geographic distribution of the 71 large floating drydocks located in the United States is shown in Table 9-4.

Floating drydocks are rarely moved. Typically, they remain in one area and support maintenance and repair work on vessels that are brought to the site. Moving a drydock from its usual place of employment requires that (a) the drydock be towed; (b) the future site be surveyed and prepared; and, in most cases, (c) arrangements be made to provide ancillary support.

Towing a drydock is a difficult task. Usually, this involves constructing a bow fairing, installing a towing assembly, and making other special preparations needed to protect the dock from adverse weather en route. Although drydocks are constructed to provide weather

TABLE 9-4 Geographic Distribution of Large Floating Drydocks in the Continental United States and Hawaiian Islands[a]

Region	Number
East Coast	30
West Coast	23
Gulf Coast	15
Great Lakes	2
Hawaiian Islands	1
Total	71

a/ Excludes drydocks less than 91.44 m (300 ft) long.

protection for machinery and equipment, they are not designed to withstand heavy seas.

Site preparation also is difficult. If a drydock is to be operational upon arrival at a new site, a suitable bed must be prepared so that the dock can ballast down. The new site must have a water depth adequate for drydock operations and be relatively current-free; any obstacles in the bed or in the approaches must be removed; and mooring equipment must be installed. If shore-based ancillary support systems are not available at the new site, barges must be used to provide for storage, messing and berthing, machinery repair, and other support functions.

A floating drydock with its ancillary support systems intact is uniquely capable of effecting any repairs needed for the drydock itself.

The one function in which most drydocks, with their ancillaries, are not self-supporting is that of drydocking the drydock. (An exception is the sectional drydock. This design permits one or more sections at a time to be separated from the rest of the drydock, rotated 90 degrees, and drydocked within the remaining sections.) In general, although some smaller drydocks can be accommodated readily by larger ones, finding adequate facilities to accommodate the larger ones can prove difficult.

Removal of drydocks from the civilian economy would reduce the industry's capability to repair ships. This could be critical during an emergency or mobilization during which the numbers of ships in need of repair were to increase.

Manning Considerations

An operating floating drydock is managed by a Docking Master. In addition, 4 or 5 Engineers usually are assigned to maintain and operate the pumps. The number of additional personnel is a function of the types of repairs underway in the dock. Typically, the full range of artificer tradesmen is available from nearby shore-based facilities.

If a dock is to be towed to a new site that does not have shore-based facilities, it is necessary to transport and berth all artificer personnel required for the anticipated repair work. In addition, a

riding crew is required while the drydock is under tow. The number of riding crew members is determined by the requirements set by the authorizing activity in accordance with recommendations of the salvage associations for each class of drydock. Usually, there are at least 9 men who stand 3-man watches, as well as the man who is in charge of the crew.

Vessel Description

The ABS Record lists only drydocks that are at least 91.44 m (300 ft) long. The largest floating drydock is slightly over 305 m (1,000 ft). Floating drydocks may be constructed of wood, concrete, steel, or any combination of these.

Drydocks range in rated lift capacity from 100 to 82,300 metric tons (100 to 81,000 long tons). However, because the actual lift capacity of the dock may be limited by the stability of the vessel to be docked, the ability of a given drydock to handle a particular vessel must be determined on a case-by-case basis.

Width between wingwalls (side walls) and water depth over floor are important considerations. These can vary for a given size of drydock. However, these variations are seldom critical; in most cases, a drydock of a given lift capacity can accommodate a vessel of the corresponding light draft. If a specially constructed vessel or barge is to be drydocked and width appears critical, it will be necessary to determine the exact widths of available drydocks. Water depth over floor may be a function of (a) water depth available, with a bottom suitable for resting the drydock, (b) height of wingwalls, and (c) stability considerations. Stability is often the overriding consideration in determining the suitability of a drydock for a specific vessel.

Most drydocks have cranes on top of their wingwalls. These cranes usually have sufficient capacity to handle any required heavy machinery or equipment.

MOTOR YACHTS

In a mobilization and in some emergencies, it is likely that military planners and commanders will need increased numbers of vessels classified as motor yachts and small craft. The Coast Guard Auxiliary provides an immediate source of such marine craft.

Coast Guard Auxiliary Description

The Coast Guard Auxiliary is a voluntary, non-military organization. Its purpose is to promote safety in recreational boating through public education, courtesy marine examinations of motor and sailing vessels, and operational activities, including regatta patrols and search and rescue (SAR) missions.

While membership in the Auxiliary is not static, adequate information concerning types of vessels and their characteristics can be

obtained from the Coast Guard Director of Auxiliary, located in each Coast Guard District Office, or from the Auxiliary Flotilla Commander, who is the elected leader of each of the Auxiliary's local units.

Vessel Availability

The Coast Guard Auxiliary has some 47,000 individual members and resources of about 13,000 vessels. Their distribution by Coast Guard District and by length is given in Tables 9-5 and 9-6. These are recreational vessels and thus vary widely in design. Approximately half are suitable for patrols or SAR missions in harbors, bays, and inlets. The smaller craft, many of which are trailered, are suitable for operations in relatively sheltered waters. Minor SAR and logistics are within the capability of most Auxiliary boats.

The Auxiliary is a volunteer force and acquisition should present few problems. To ensure that the organization is available as needed to assist the Coast Guard, its members are prohibited from enlisting in local civil defense efforts. It is interesting to note that, under the Geneva Convention, Auxiliary volunteers are accorded military status. During World War II, the Auxiliary was used extensively for many types of missions, including port security, beach patrol, and anti-submarine patrol.

TABLE 9-5 Numbers of Coast Guard Auxiliary Vessels by Coast Guard Area and District

Coast Guard Area a/	Coast Guard District a/	District Headquarters	Number of Vessels	
Atlantic	1st	Boston, MA	563	
	2nd	St. Louis, MO	1,993	
	3rd	New York, NY	2,717	
	5th	Portsmouth, VA	1,208	
	7th	Miami, FL	1,707	
	8th	New Orleans, LA	727	
	9th	Cleveland, OH	1,626	
Subtotal, Atlantic Area				10,541
Pacific	11th	Long Beach, CA	635	
	12th	San Francisco, CA	875	
	13th	Seattle, WA	873	
	14th	Honolulu, HI	68	
	17th	Juneau, AK	54	
Subtotal, Pacific Area				2,505
Total				13,046

a/ For Coast Guard area and district boundaries, see map, Figure B-1, Appendix B.

Source: U.S. Coast Guard Data Bank, Jan. 29, 1979.

TABLE 9-6 Distribution of Coast Guard Auxiliary Vessels by Length

Length Overall (Ft.)	Percentage of Total Vessels	Cumulative Percentage
Less than 16	5.30	5.30
16 - 26	54.62	59.92
27-39	33.73	93.65
40-65	6.23	99.88
Over 65	0.12	100.00

Source: U.S. Coast Guard special computer run, December 15, 1978.

Manning Considerations

Many Auxiliary members are competent small-boatmen with some knowledge of the Coast Guard, voice communication procedures, small-boat piloting, and elementary engine maintenance. Many also are extremely knowledgeable about the waters in their vicinity and the craft that frequent those waters. In general, Auxiliary operations have a greater likelihood of success when vessels are operated by persons familiar with both (a) the power plant and handling characteristics of each vessel and (b) the waters in which the mission takes place.

Vessel Description

As indicated above, the approximately 13,000 motor yachts and small craft in the Coast Guard Auxiliary vary widely in size and in design.

The Auxiliary operates about 520 Auxiliary Land and Mobile Radio Stations. These stations are capable of working either the 2-3 kHz HF-AM or the 156-162 MHz VHF-FM marine bands, or both. Fixed and Mobile Land Stations are not required to have CW capability. No extensive wartime use of Auxiliary Radio Stations is planned. However, this does not preclude their use should the need arise.

FERRIES

Industry Description

Harbor ferries operate on the East and West Coasts; most carry both passengers and vehicles. In the East, they are most numerous in New York Harbor, with a few vessels in New England, Long Island Sound, and Chesapeake Bay. The nation's largest ferry fleet is the Washington State Ferry System. In addition, on the West Coast, the Alaskan State System operates between Seattle and Anchorage via southeastern Alaskan ports.

Data on the East Coast ferries were not available. However, the East Coast vessels are believed to fall within the capability range of the Washington State fleet, although they are fewer in number. The Alaskan ferries are also few in number, but they are highly capable, oceangoing passenger and vehicle carriers. For the most part, the balance of this section describes the Washington State Ferry System.

In all, the Washington State Ferry System has 18 vessels. The fleet operates on 9 different routes serving 20 terminals in Puget Sound. They travel 820,000 nmi per year, or about 2,200 nmi per day. The total system employs 1,100 people during the summer months and about 920 during the rest of the year.

Passenger traffic totaled 8,900,000 in 1976 and is increasing at the rate of 3 percent a year. Vehicle traffic, which totaled 7,200,000 in 1976, is increasing at the rate of 6 percent a year.

Vessel Availability

During the peak summer months, all available Washington State ferries are used; only 12 vessels are used to maintain schedules during the balance of the year. Their operating area is in Puget Sound, an estuary approximately 100 nmi long and 5 to 10 nmi wide.

In all cases, logistic support is provided by shoreside personnel who are always close at hand. These vessels are not designed or outfitted for extended sea voyages, although such modifications could be made. (In contrast, the Alaskan ferries are seaworthy, oceangoing vessels.)

Given the annual increase in utilization of ferries by both passenger and vehicle traffic, requisition of these vessels could cause significant disruption, particularly during the summer months.

Manning Considerations

Older Washington State ferries have 4- to 9-man crews; the newer vessels carry 14 crew members. Vessels are berthed every night; thus, the crews usually do not operate away from home port for more than one day.

Vessel Description

Washington State Ferries

Washington State ferries vary greatly in size, age, and capacity; however, for purposes of description, they can be grouped into two size categories. The larger vessels, built between 1967 and 1972, are 116 to 134 m (382 to 440 ft) in length and have 5.2- to 5.5-m (17- to 18-ft) drafts. Their 5,950- to 6,350-kW (8,000- to 8,500-bhp) diesel-electric, twin-screw propulsion systems drive them at 20 knots. They can carry 2,000 to 2,500 passengers and 160 to 206 automobiles.

The smaller vessels date from 1928 (retrofitted) to 1967, range from 61 to 95 m (200 to 310 ft) in length, and have drafts of 2.4 to 4.6 m (8

to 15 ft). Their capacities range from 200 to 1,140 passengers and from 40 to 100 automobiles. Speeds are 10 to 13 knots. All Washington State vessels are double-ended, allowing for rapid through-loading and discharge of automobiles. There are two or three decks, depending on vessel size.

Alaskan State Ferries

Alaskan State ferries, which carry passengers and vehicles between Seattle and various southeastern Alaskan ports as far north as Anchorage, range in length from 30 to 127 m (100 to 418 ft). The 3 107.29-m (352-ft) vessels built in 1963 are typical. These ships, MALASPINA, MATANUSKA, and TAKU, have 600-kW (800-bhp) diesels, carry 500 passengers and 105 vehicles, and have drafts of 4.6 m (15 ft). They have both stern and side doors for vehicle loading and discharge.

MARINE SALVAGE VESSELS

The primary purposes of salvage missions are (a) to refloat or rescue stranded or disabled vessels and (b) to remove wrecks and to keep beaches, river channels, sea approaches, and ports clear. For the most part, clearing beaches is the responsibility of military amphibious forces, and the necessary equipment, techniques, and procedures are well established. These military units also have specialized craft and rarely rely on civilian vessels. However, civilian resources have an important role to perform in other salvage missions. Indeed, for the most part, the private sector provides the only available salvage vessels, cranes, dredges, and other equipment.

Industry Description

The U.S. marine salvage industry may be defined so broadly that it includes nearly every existing U.S.-flag vessel or so narrowly that it is limited to one single ship. In part, this is because many vessels of varying types carry out marine salvage operations on a regular or irregular basis between the assignments for which they are designed, built, equipped, and manned. Such vessels are termed "salvage vessels of opportunity." While they lack the broad capabilities of specialized, purpose-built salvage vessels, their use avoids the significant economic risks of constructing and maintaining dedicated salvage vessels on station. In addition, improvements in navigational aids, ship positioning systems, and the quality of personnel have reduced the incidence of strandings in U.S. coastal waters and thus reduced the need for "on-station" salvage ships.

The only active U.S.-flag, privately owned salvage vessel in operation today is a converted LSM (Landing Ship, Medium), SALVAGE CHIEF, of the Fred Devine Diving and Salvage Company on the U.S. West Coast. Two salvage barges owned by Ingram, which were built to operate as lift craft in inland waters, are currently in lay-up status in the

Mississippi River. The two U.S. Navy-owned, commercially outfitted, registered, and certificated ARS-type salvage ships are on lay-up status in Key West, Florida. Recently, they were bareboat chartered to the Murphy Pacific Marine Salvage Company under terms of the Salvage Act; and it is likely that they, or their replacements, will be similarly chartered in the future. All four of the latter vessels could be made operational with little difficulty.

Marine salvage comprises three broad categories: (a) refloating of stranded ships, (b) rescue of disabled ships, and (c) wreck removal. Each is described briefly below.

Refloating of Stranded Ships

To refloat a stranded ship, the salvage vessel must have sufficient pulling force to drag the ship afloat or to hold it from broaching while it is being lightened or temporarily repaired. This is accomplished by the salvage vessel's engines and by a system of beach gear that includes anchors, chains, wires, and purchases. In addition, the salvage vessel may provide divers for repair or inspection, and offer a wide range of services from dewatering to emergency electrical, steam, or air power. Using its engines, it may be able to effect a dredging action by scouring the bottom. Finally, it may have the capability of towing the refloated ship to a port of refuge.

Conventional tugs or tug-supply vessels may have sufficient pulling or scouring power. In conjunction with barges, they also may lay available beach gear. If specially outfitted, they may provide basic diving services.

Cargo vessels, tankers, or barges may be used for lightering cargo or bunkers. Dredges may be used to cut channels in order to refloat the ship.

Rescue of Disabled Ships

Casualties in the open sea may require fire fighting or towing services that may be provided by a salvage ship, a conventional tug or tug-supply vessel, or--in some instances--another ship. Such missions also may require diving, patching, or sealing; dewatering in large quantities; or other related services. Specialized salvage tugs usually are the only vessels that routinely have such capabilities, although, if time permits, conventional tugs may be outfitted to provide at least some of these services. Any vessel of adequate horsepower can provide the holding force necessary to keep the disabled ship off the lee shore while other work is in progress.

Derricks, lightering vessels, and dredges rarely become involved in offshore operations, although there are circumstances in which lightering may be required to develop reserve buoyancy or overcome weight increase due to flooding. Once the disabled vessel is in port or beached in a protected area, floating derricks, lightering vessels, and pollution control vessels may be employed.

Wreck Removal

With the exceptions of small craft and barges, it usually is not economically feasible to return sunken ships to service. However, wrecks often must be moved or removed (a) to permit transit of other ships, (b) to deepen channels, (c) to remove their pollution potential, or (d) because they are esthetically unacceptable to the community.

The marine construction industry provides the best resources for wreck removal. Floating cranes and derricks often can lift whole ships and structures from the bottom; when the weight is beyond their capacity, they can lift sections of the wreckage cut by divers. Pollution control vessels can sweep the area to clean up escaped oil or other floating hazardous or polluting substances. In some cases, dredges can remove cargo. Specially outfitted barges or other vessels can provide diving services and equipment for refloating the wreck. Many types of vessels can be outfitted to serve as pontoons or lift barges, similar to the Ingram barges and the Navy's heavy-lift craft.

Commercial contracts for marine salvage run the gamut of the usual negotiated contractual forms with one exception. Many refloating missions in offshore strandings are undertaken on a "no cure-no pay" basis under which the salvage contractor assumes all risks of the venture and, if successful, is rewarded handsomely by a previously designated arbiter. If unsuccessful, the salvor bears all costs. The Lloyd's Open Form No Cure-No Pay contract is standard, but many variations exist. There are no cure-no pay lump sum contracts, per diem contracts, per diem plus bonus contracts, and many others.

Vessel Availability

The only operational commercial offshore salvage vessel in the United States is stationed on the West Coast. The capabilities of other vessels in salvage situations are directly related to the nature of the casualty. In general, "vessels of opportunity" are limited to those aspects of salvage that are most closely related to their own areas of specialization, or for which they can be readily adapted.

For more information concerning ownership of vessels of opportunity and the commercial impact of their call-up, see the sections on "Ocean-Classed Tugs" and "Ocean-Classed Barges" (Chapter 6), and "Offshore Service and Supply Vessels" (Chapter 7). Although much information is available about the most common types of vessels of opportunity, it should be stressed that the validity of the data varies markedly. Because these vessels are privately owned and operated in competitive markets, the information furnished often is part of the company's or industry's advertising strategy. Also, because salvage is not the primary business of most vessels, the data on any given vessel must be interpreted to determine whether the vessel is suitable for the salvage job required. Sometimes, a photograph or general arrangement plan is most useful because it shows a davit or cargo boom or clear deck area that is unmentioned in the written description.

Manning Considerations

The decline in the U.S. marine salvage industry, with its reliance on vessels of opportunity and foreign-flag salvage vessels, has considerably depleted the ranks of professional salvors in the United States. This could present problems in an emergency or mobilization. Good, basic seamanship and practical engineering are the cornerstones of a good salvage practitioner; and these skills do, of course, exist among the operators of vessels of opportunity. However, the value of experience gained through conducting multiple salvage missions cannot be discounted.

Vessel Description

Descriptions of the various vessels commonly used in salvage are given in the sections on "Ocean-Classed Tugs" and "Ocean-Classed Barges" (Chapter 6), and "Offshore Service and Supply Vessels" (Chapter 7). As noted above, vessels used to conduct a salvage operation must be selected with regard to the nature of the casualty involved.

In general, an ideal salvage vessel should be ruggedly built, highly maneuverable, and relatively small: approximately 67 m (220 ft) in length, with a 12.2-m (40-ft) beam and shallow draft. Speed, while important, is not as essential as bollard pull. The vessel also should have sufficient accommodations for both salvage personnel and navigating crew, and adequate storage holds for portable salvage machinery.

AIR CUSHION VEHICLES, SURFACE EFFECT SHIPS, AND HYDROFOILS

Industry Description

Commercial use of U.S.-flag air cushion vehicles (ACVs), surface effect ships (SESs), and hydrofoil vessels is virtually non-existent at this time. From time to time, short-lived operations have been initiated, including passenger ferries and tourist sightseeing vessels. Applications as fireboats, offshore crew boats, and remote area transportation vessels are currently planned or proposed.

Air Cushion Vehicles

Only one ACV of significant size, excluding lightweight sport-type craft, is currently operational in the United States. This is a 60- to 65-passenger ferry (HM2 Mark III) owned by the Commonwealth of Massachusetts. The craft is slated to be put into service, on a trial basis, in the Boston area. Previously, it was operated by the City of Miami, Florida.

Future craft include two fireboats (HM2 Mark IV), which are to be delivered in late 1979 and early 1980 to the city of Tacoma, Washington. In addition, New York City is planning to operate ACV passenger ferries,

similar to the HM2, between New York and New Jersey. If purchased, these ferries will be U.S.-built, as required by the Jones Act (Merchant Marine Act of 1920, Sec. 27; 46 U.S.C. 833). The Alaska state government is planning to contract with a private firm for an ACV test. This firm will lease an ACV for approximately one year to test its feasibility as a mode of transporation in Alaska.

Surface Effect Ships

Bell Aerospace Division of Textron, Inc., and Halter Marine Services, Inc., have undertaken, as a joint venture, the construction of a 33.53-m (110-ft), high-performance, air cushion-assisted surface effect ship. The proposed vessel is being designed for offshore, patrol, customs, crew, ferry, security, or fire service. The craft will be leased to an offshore crewboat operator for a 3-month trial, probably in 1979. A smaller, 14.63-m (48-ft) SES may be built for use in survey operations by the U.S. Army Corps of Engineers.

Hydrofoils

At present, only 6 hydrofoils are in commercial use in the United States. Of these, 3 are foreign-built, foreign-flag PT-150 vessels that operate between Miami, Florida, and Nassau and Freeport in the Bahamas. The other 3 are 28-seat hydrofoils that provide 10-minute sightseeing tours at Sea World in San Diego, California.

Until recently, three *Jet-Foil hydrofoil* craft, built by Boeing Marine Systems in Seattle, provided inter-island transportation in the Hawaiian Islands, but they were taken out of operation and sold during late 1978. In addition, an experimental Jet-Foil passenger service was in operation between Seattle, Washington, and Victoria, British Columbia. The test was operationally successful; however, no permanent hydrofoil service has been established.

In the 1960s, another hydrofoil craft was operated in passenger service between Seattle and Victoria. Later, it operated between Los Angeles and Catalina Island, California. The craft was recently sold as surplus, and the new owner is understood to be refurbishing it. Future plans are not known. For names and addresses of manufacturers and operators of ACVs, SESs, and hydrofoils, see Appendix B.

Vessel Availability

The number of ACVs, SESs, and hydrofoils in service or planned is so limited that no statement of availability can be made. However, it should be noted that such vessels usually require extensive logistic support, and that most services must be performed in port.

Manning Considerations

Because of the limited number of vessels and the experimental nature of these craft, optimal manpower characteristics are not known. Crews are usually small (2 to 4), and they require special training.

Vessel Description

In general, ACVs are craft supported on a cushion of air provided by engine-driven fans. They usually have flat bottoms, and the air is trapped underneath by flexible skirts (in truly amphibious craft) or by a combination of flexible and solid seals (in craft limited to water transit). In either type, the vehicle is fully air-cushion supported, with no penetration of the water surface by the skirts or seals. These vessels usually are constructed of aluminum alloy and are powered by lightweight diesel or gas turbine engines. Generally, they are capable of higher speeds than displacement or planing craft. A length-to-beam ratio of 2 is typical. Amphibious ACVs range in size from the small, single-seat, sport models to the British Hovercraft, which weighs about 165 metric tons and provides passenger and vehicle ferry service across the English Channel.

The SESs are a special category of ACVs that are intended solely for waterborne service. They have solid sidewalls and flexible bow and stern seals for air cushion containment. The solid sidewalls penetrate the water surface and usually house all or part of the propulsion machinery. Existing SESs vary widely in size; the U.S. Navy plans to build a 3,000-metric ton SES.

Hydrofoils are equipped with appendages (foils) that provide sufficient dynamic lift at operating speeds to raise the vessel's hull clear of the water surface. Two types of foils are typical: fully submerged and surface-piercing. Vessels vary in size and some weigh more than 100 metric tons.

Because the numbers in service or planned are so limited, there is no "typical" U.S.-flag commercial ACV, SES, or hydrofoil. For this reason, no Vessel Characteristics forms or illustrations of these types are included in Appendix A.

APPENDIXES

APPENDIX A

VESSEL CHARACTERISTICS FORMS AND VESSEL ILLUSTRATIONS

This appendix contains the Vessel Characteristics sheets and vessel illustrations. These are preceded by an index and an explanation of the terms used in the forms. The index not only lists the vessel types and classes for which Vessel Characteristics forms are included, with their page numbers, but also gives cross-references to the vessel illustrations.

No forms are included for (a) motor yachts, because of their extreme variation in design, or (b) advanced marine vehicles (air cushion vehicles, surface effect ships, and hydrofoils), because the numbers in service or planned are so limited that there is no "typical" U.S.-flag commercial ACV, SES, or hydrofoil.

INDEX

EXPLANATION OF TERMS

Each line entry of the Vessel Characteristics forms is described below. In some cases, rules of thumb are included.

Since each form describes a class of vessel, values are expressed as ranges wherever the data permit. For most parameters, values are given in dual units with the metric (SI) units shown as primary and the U.S. customary units given in parentheses. Where a characteristic is common but not universal, the number of vessels or approximate percentage of vessels possessing that characteristic is given (e.g., "bow thruster on 80 percent").

A. GENERAL SERVICE PARTICULARS

1. Normal Service Functions Brief description of normal vessel uses.
2. Length, Beam, Depth Maximum dimensions, in meters (and feet). For integrated tug-barge units, combined length is given.

   Draft In most cases, spans the range of minimum and maximum draft. For semisubmersibles, draft in transit is given; for ferries, loaded draft.

   Height Above Water Maximum height of fixed structure or mast above water, indicating the required under-bridge clearance.
3. Propulsion Type Diesel, diesel-electric, etc.; or non-propelled. For non-propelled vessels, the type of auxiliary power (diesel, steam) is given in some cases.

   Total Horsepower Total installed power for all main engines, in brake horsepower (bhp) for diesels and shaft horsepower (shp) for steam propulsion. (1 hp = 0.7457 kW.)

   Fuel Requirement Type of fuel (most commonly, No. 2 diesel oil). Where available, fuel consumption rates (per hour, cruising) are included.

   NOTE: As a rule of thumb, fuel consumption rates for medium-speed diesels generally range between 0.40 and 0.45 lb per shp-hr, or about 0.05 gal per shp-hr.

   In the event of a requisition or mobilization, it is likely that the affected vessels would be fueled through the U.S. Navy supply system. Number 2 diesel fuel (grade DF-2), the principal design fuel used by commercial vessels in the continental United States (CONUS), is not stocked by the U.S. Navy or carried aboard naval vessels because of its low flash point, which the Navy views as a safety hazard.

   Fueling commercial vessels and craft with the Navy diesel fuel (grade DF-M) is likely to cause an increase in maintenance requirements and problems. The DF-M is a heavier fuel than DF-2, with higher distillation temperatures and flash point; is more viscous; and, because of its higher permissible sulfur content, is more corrosive.

The foregoing applies to commercial vessels, most of which are diesel-powered. In contrast, the great majority of Coast Guard Auxiliary vessels (Motor Yachts, Chapter 9) are gasoline-powered. Most are privately owned, used mainly for pleasure boating, and of limited range and endurance. As shown in Table 1-1, the two military functions for which Auxiliary vessels appear best suited are (a) port safety and security and (b) search and rescue. Thus, most would be used in or near U.S. harbors and would be refueled with gasoline from their normal sources--presumably on a priority basis in an emergency or mobilization.

The Navy operates on two fuels: DF-M and JP-5. Military vehicles, which use DF-2 in CONUS, are resupplied overseas with DF-M. JP-5 is used primarily as aviation fuel, but has been tested as fuel for both military vehicles and naval vessels. It burns hotter and produces more soot than DF-M; but, because of its lower sulfur content, it is less corrosive. Hence, the military are considering the use of JP-5, instead of DF-M, as the alternate fuel for vehicles when DF-2 is unavailable.

For comparison of the properties of DF-2, DF-M, and JP-5, see, respectively: (1) Federal Specification VV-F-800B, "Fuel Oil, Diesel", April 2, 1975; (2) Military Specification MIL-F-16884G, "Fuel Oil, Diesel, Marine", Amendment 1, March 22, 1978; and (3) Military Specification MIL-T-5624K, "Turbine Fuel, Aviation, Grades JP-4 and JP-5", April 1, 1976.

4. Cruising and Maximum Speeds In knots (nautical miles per hour). Note that, in two of the sectors covered, Offshore Service and Supply Vessels and Motor Yachts (recreational boating), industry data sources sometimes give vessel speeds in miles per hour and sometimes in knots. (1 knot is approximately 1.16 statute miles per hour.)
5. Endurance at Above Speeds In days and nautical miles.
6. Required Crew Complement The number of personnel required for vessel operation and, where applicable, for on-site work (e.g., salvage, dredging, drilling).

   Total Accommodations Number of berths. For crew boats, the number of passenger seats is also specified.
7. Maximum Sea State in Which Vessel Can Operate Expressed in terms of the Beaufort wind scale.
8. Vessel Maneuverability Specifies the presence of features that increase maneuverability (e.g., bow or stern thrusters, steerable Kort nozzles, twin screws, controllable-pitch propellers, twin or triple rudders, anti-roll stabilizers).
9. Cargo Deadweight on Deck and Below Deck Cargo capacities in tonnes (metric tons of 2204.6 lb).

   Net Cubic Capacity, Dry and Liquid Below-deck capacities, in cubic meters (and cubic feet).
10. Dry Stores Capacity In cubic meters (and cubic feet) and/or tonnes. FOr the majority of vessel classes covered, capacity is adequate only for crew consumables.

11. Reefer Capacity Refrigerated space, in cubic meters (and cubic feet) and/or tonnes.
12. Clear Cargo Area, on Deck and Below Deck In square meters (and square feet).
13. Average Deck Strength Capacity for homogeneous deck loading, rather than concentrated (or point) loads, in kilograms per square meter (and pounds per square foot). Where vessels are capable of unusually high concentrated loads, this is separately indicated.
14. Cargo and Material Handling Capability Specifies the types of cargo gear installed (e.g., cranes, winches, pumps, stern ramps); their capacities; and, where applicable, the radius at which the maximum load can be lifted.
15. Navigation and Communication Equipment Specifies equipment normally installed.
16. Year Built The range of years during which the vessels were built. If the distribution is heavily concentrated in a given year or period within the range, this also is indicated.

    Hull Material Steel, aluminum, wood, fiberglass, concrete.
17. Classification Society Status Specifies the cognizant classification society designation and present status. If the vessels are not classed, this is indicated.
18. Fresh Water Making and Washdown Capability Indicates whether vessel has distillers and, if so, their storage capacity; and whether water washing is available through on-deck firemains.

    NOTE: Fresh-water washdown capability is of particular importance for vessel-based helicopter operations, to counteract the corrosive effect of the marine environment.

19. External Firefighting Capability Indicates whether the vessel is outfitted with fire monitors (i.e., water cannon), and whether it also is equipped with a foam system for use in conjunction with them.
20. Tow Winch and Bollard Pull Indicates whether the vessel has a towing winch, and, if so, specifies the bollard pull in tonnes and the line speed in meters per minute (and feet per minute).

    NOTE: Bollard pull can be approximated as 20 to 30 lb per bhp for open screws and 30 to 40 percent higher (or about 26 to 42 lb per bhp) with Kort nozzles.

21. Helipad Indicates whether the vessel can accommodate helicopter landings and take-offs.
22. Ice Strengthening Indicates whether the vessel is ice-strengthened and, if so, the class of strengthening and the cognizant classification society.
23. Miscellaneous Features Specifies additional equipment or features that might enhance the vessel's suitability, as is, for military requirements. Examples include multi-point mooring systems and vessel positioning systems; trim tanks, beaching

capability, and stern ramps; stern rollers, A-frames, winches, and capstans; salvage gear and diving equipment.

B. VESSEL ADAPTABILITY

24. Convertibility of Tanks for Fuel or Other Liquids Indicates whether certain tanks can be designated for carriage of other than their normal contents. Examples include ballast tanks, pressure tanks, potable water tanks, "P" tanks (pneumatically discharged tanks normally used to carry dry mud or cement), fish or shellfish holds, and double bottoms.
25. Additional Passenger Berths Indicates whether the vessel can be converted easily to carry additional passengers in existing accommodation spaces, and whether containerized quarters modules can be placed and secured on open deck space to increase passenger accommodations.
26. Container Capacity Specifies the number, size, and weight of containers that can be loaded on deck areas. The number is sometimes expressed in TEUs (Twenty-Foot Equival Units), i.e., the number of standard 20 × 8 × 8-ft containers that can be accommodated.
27. Maintenance and Repair Facilities Specifies the types of facilities and equipment available (e.g., metal-working machines, welding equipment).
28. Special Cargo Carriage Indicates whether the vessel can accommodate heavy, outsized loads (e.g., tanks, locomotives, bulldozers, small craft), and whether it is capable of roll-on, roll-off (RO/RO) loading and discharge of trailers and vehicles.
29. Large Portable Crane Mountable Indicates whether it is feasible to convert the vessel by mounting a portable crane; and, if so, specifies the capacity and outreach of the largest portable crane that has been or could be mounted.
30. Underway Replenishment Indicates whether vessel can be replenished underway.
31. Other Possible Features Specifies additional features or possible modifications that might enhance the vessel's ready adaptability for military requirements. (Note contrast with definition 23, above).

C. BARGE CHARACTERISTICS

32. Configuration of Bow Indicates whether bow is ship-shaped, rounded (spoon-shaped), or flat slab in configuration; and specifies maximum towing speed for each configuration.
33. Compartmentation Below Deck Indicates longitudinal or transverse framing or bulkheads; and specifies numbers of longitudinal and transverse watertight bulkheads, and number of tanks, if any.
34. Type of Skegs Indicates whether skegs are fixed or adjustable. (A skeg is a foil or box-shaped structure that is added to the

barge's stern to improve its towing characteristics. All or a portion of the skeg may be hinged so that its angle with respect to the barge's centerline is adjustable.)

35. Miscellaneous Features Includes, e.g., deck house and door dimensions (for a house barge), multiple decks (for a RO/RO trailer barge), or onboard generating capacity.

D. DERRICK OR CRANE BARGE CHARACTERISTICS

36. Capacity in Each Mode Indicates the type of derrick or crane mounted on the barge (revolving, sheer-leg or A-frame) and its capacity. For the revolving type, capacity in each mode (fixed and revolving) is given. (The lift capacity of a revolving crane used in fixed mode may be as much as double its capacity when its revolving capability is used.) Also indicates whether mobile (wheeled or tracked) cranes are used and, if so, their capacity.

E. DREDGE CHARACTERISTICS

37. Capacity of Main Equipment Specifies the diameter of the suction head (for suction or cutter suction dredges) or the volumetric capacity of the clamshell or dragline bucket (for clamshell/bucket dredges).

INDUSTRY TUG AND BARGE

VESSEL TYPE OCEAN TUG CLASS 9000-10,999 BHP

APPROXIMATE NO. IN SERVICE 25

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Ocean towing, anchor handling, salvage
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 60-76 m (200-250 ft) Beam 12-15 m (40-50 ft) Depth 6-8 m (20-27 ft) Draft 5-7 m (16-23 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 9000-10,999 BHP No. 2, diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	12-14/15-20 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	20-30 days/6000-12,000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	20-30 crew, 20-30 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 10
8.	VESSEL MANEUVERABILITY	Bow thruster on 80%, twin screw on 100%
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	120-150/30-50 tonnes, 700-1200/1000-2000 m^3 (24,710-42,360/35,000-70,000 ft^3)
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	100-200 m^2 (1080-2160 ft^2) on deck only
13.	AVERAGE DECK STRENGTH	6000 kg/m^2 (1228 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Hydraulic crane: 4-10 tonnes @ 10 m (33 ft) radius, with cargo lashings provided
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Telex, anti-collision radar, RDF, fathometer, autopilot, Decca; VHF, SSB radios; gyromagnetic compass, Satl.Navig.
16.	YEAR BUILT, HULL MATERIAL	1966-1978, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class, A-1 Towing
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None, salt water washdown only
19.	EXTERNAL FIREFIGHTING CAPABILITY	Yes, water/foam monitor 60 m (198 ft) range
20.	TOW WINCH (yes/no), BOLLARD PULL	Yes, 150 tonnes @ 8 m/min (26 ft/min)
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	20% ice class
23.	MISCELLANEOUS FEATURES	Salvage gear, diving equipment, hydraulic capstans, tugger winches

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Ballast tanks readily convertible, ballast pumps @ 132-264 gpm
25.	ADDITIONAL PASSENGER BERTHS	May add 20-50% existing berths
26.	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	Anchors, afterdeck strengthened to 10,000 kg/m^2 (2048 lb/ft^2)
29.	LARGEST PORTABLE CRANE MOUNTABLE	Hydraulic boom, 4-10 tonnes @ 5-10 m (17-34 ft) radius
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	2-4 m (3-6 ft) diam. stern roller; anchor handling winch: 300 tonnes @ brake, 200 tonnes @ 6.2 m/min (20 ft/min)

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY TUG AND BARGE

VESSEL TYPE OCEAN TUG CLASS 7000-8999 BHP

APPROXIMATE NO. IN SERVICE 43

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Ocean towing, anchor handling, salvage
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 41-46 m (136-150 ft) Beam 11-12 m (37-40 ft) Draft 5-6 m (19-22 ft) Height 11-12 m (37-40 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 7000-9000 BHP, No. 2 diesel fuel 300-500 gph @ full power
4.	CRUISING/MAXIMUM SPEEDS	12-14/13-15 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	20-30 days/8000-10,000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	8 crew, 11 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 9
8.	VESSEL MANEUVERABILITY	250-350 HP bow thruster, 25 have triple rudders, 14 have Kort nozzles, all are twin screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	20-30 tonnes on deck, 800-900 m^3 (28,240-31,770 ft^3) liquid
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	180-220 m^2 (1930-2400 ft^2)
13.	AVERAGE DECK STRENGTH	10,000 kg/m^2 (2048 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Diesel-powered double-drum winch with (2) 1000-1500 m (3300-4950 ft) of 5-6 cm (2.0-2.3 in) wire
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Radar, RDF, gyromagnetic compass, depth sounder, LORAN; SSB,VHF radios; satellite navigation
16.	YEAR BUILT, HULL MATERIAL	1974-1978, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class, A-1 towing
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	Yes, 3-4 fire hoses on main deck
20.	TOW WINCH (yes/no), BOLLARD PULL	Yes, 100-225 tonnes
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	6 are ABS Class 1-C
23.	MISCELLANEOUS FEATURES	Stern roller

B. VESSEL ADAPTABILIT

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Conversion of ballast tanks, 100-300 m^3 (3530-10590 ft^3)
25.	ADDITIONAL PASSENGER BERTHS	3-4
26	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	Stern of vessels reinforced for towing and anchor handling
29.	LARGEST PORTABLE CRANE MOUNTABLE	Hydraulic boom, 1-2 tonnes @ 7-10 m (23-33 ft) radius
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY TUG AND BARGE

VESSEL TYPE OCEAN TUG CLASS 5000-6999 BHP

APPROXIMATE NO. IN SERVICE 18

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Towing, anchor handling, salvage
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 38-46 m (125-150 ft) Beam 11-12 m (37-40 ft) Depth 5-6 m (16-20 ft) Draft 5-6 m (17-19 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 5000-7000 BHP, No. 2 diesel, 200 gph @ cruising
4.	CRUISING/MAXIMUM SPEEDS	12-14/13-15 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	28-43 days/5000-10,000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	8 for towing, 10 for anchor handling, 10-14 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 9
8.	VESSEL MANEUVERABILITY	(10) have triple rudders, (6) have Kort nozzles, all are twin screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	18-23 tonnes on deck only, 440-475 m^3(15532-16700 ft^3) liquid
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	167-220 m^2 (1800-2400 ft^2)
13.	AVERAGE DECK STRENGTH	10,000 kg/m^2 (2048 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Diesel-powered double-drum winch with (2) 1500-2000 m (4950-6600 ft) of 5-6 cm (1.9-2.3 in) wire
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	RDF; radar; SSB, VHF; LORAN or Decca; fathometer; gyromagnetic compass, satellite navigation
16.	YEAR BUILT, HULL MATERIAL	1968-1976, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class, A-1 Towing
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None, salt water washdown only
19.	EXTERNAL FIREFIGHTING CAPABILITY	All have deck stations w/hose
20.	TOW WINCH(yes/no), BOLLARD PULL	Yes, 75-125 tonnes
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	3 known to have special firefighting monitors

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Conversion of ballast tanks, 1000-2000 m^3 (35,300-70,600 ft^3)
25.	ADDITIONAL PASSENGER BERTHS	3-4 on all tugs
26.	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	Stern of vessels reinforced for towing and anchor handling.
29.	LARGEST PORTABLE CRANE MOUNTABLE	Hydraulic boom, 1-2 tonnes @ 5-7 m (16-23 ft) radius
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	None

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY TUG AND BARGE

VESSEL TYPE OCEAN TUG CLASS 4000-4999 BHP

APPROXIMATE NO. IN SERVICE 36

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Towing, anchor handling, salvage
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 35-42 m (115-136 ft) Beam 9-11 m (30-35 ft) Depth 4-5 m (15-17 ft) Draft 4-5 m (13-15 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 1000-5000 BHP, No. 2 diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	10-13/13-15 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	25-54 days/10,000-15,000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	8-10 crew, 10-14 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 8
8.	VESSEL MANEUVERABILITY	Twin rudder, twin screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	15-20 tonnes on deck only, 450-500 m^3 (15885-17650 ft^3) liquid
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	125-185 m^2 (1300-2000 ft^2)
13.	AVERAGE DECK STRENGTH	10,000 kg/m^2 (2048 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Diesel-powered double-drum winch with (2) 700-800 m (2310-2640 ft) of 5 cm (2.0 in) wire
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Radar; SSB, VHF radios; depth sounder; LORAN; RDF; gyromagnetic compass
16.	YEAR BUILT, HULL MATERIAL	1968-1976, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class, A-1 Towing
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	Yes, main deck monitors
20.	TOW WINCH (yes/no), BOLLARD PULL	Yes, 100-120 tonnes
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	Stern rollers for anchor handling

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Conversion of ballast tanks, 1000-2000 m^3 (35300-70600 ft^3)
25.	ADDITIONAL PASSENGER BERTHS	3-4
26.	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	Stern of vessel reinforced for towing and anchor handling
28.	SPECIAL CARGO CARRIAGE	No
29.	LARGEST PORTABLE CRANE MOUNTABLE	Yes
30.	UNDERWAY REPLENISHMENT (yes/no)	
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY TUG AND BARGE

VESSEL TYPE OCEAN TUG CLASS 3000-3999 BHP

APPROXIMATE NO. IN SERVICE 50

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Coastal towing, ocean towing in Alaska, Caribbean, ship docking work
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 33-40 m (110-133 ft) Beam 9-11 m (30-35 ft) Depth 4-6 m (13-20 ft) Draft 3-4 m (12-15 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 3000-4000 BHP, No. 2 diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	12-14/13-15 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	20-34 days/8000-12,000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	8-10 crew, 11-14 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 8
8.	VESSEL MANEUVERABILITY	Twin screw normal
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	13-18 tonnes on deck only, 367-380 m^3 (12955-13414 ft^3) liquid
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	90-140 m^2 (970-1500 ft^2) on deck only
13.	AVERAGE DECK STRENGTH	10,000 kg/m^2 (2048 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Diesel-powered double-drum winch with (2) 610-750 m (2013-2475 ft) of 5 cm (2.0 in) towing wire
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Radar; SSB and VHF radios; fathometer; LORAN or Decca
16.	YEAR BUILT, HULL MATERIAL	1968-1976, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class, A-1 Towing
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	Yes, main deck hose stations.
20.	TOW WINCH (yes/no), BOLLARD PULL	Yes, 20-90 tonnes
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	Stern roller for anchor handling

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Conversion of ballast tanks, 800-1200 m^3 (28240-42360 ft^3)
25.	ADDITIONAL PASSENGER BERTHS	3-4
26.	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	Stern of vessel reinforced for towing and anchor handling
29.	LARGEST PORTABLE CRANE MOUNTABLE	No
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY TUG AND BARGE

VESSEL TYPE OCEAN SERVICE BARGE CLASS DECK BARGE

APPROXIMATE NO. IN SERVICE 113

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Deck cargo, containers, lighterage, oil exploration, container feeder service
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 73-122 m (240-400 ft) Beam 13-30 m (44-100 ft) Depth 4-8 m) 15-2? ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Non-propelled
4.	CRUISING/MAXIMUM SPEEDS	5.5-11 Knots (depends on tow FT)
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	None
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	None
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 9
8.	VESSEL MANEUVERABILITY	None
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	2500-12,500 tonnes on deck, 11,000-42,000 m^3 (388,200-1,482,600 ft^3) dry
10.	DRY STORES CAPACITY	In containers, capacity governed by deadweight
11.	REEFER CAPACITY	Refrig. containers cap. governed by DWT & powr. avail.
12.	CLEAR CARGO AREA (on deck/below deck)	940-3530 m^2 (10,152-38,124 ft^2)
13.	AVERAGE DECK STRENGTH	7500 kg/m^2 (1536 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Barges could support portable crane, some barges have timber or asphalt decks laid over steel decks for working with crawler or wheeled vehicles
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	None
16.	YEAR BUILT, HULL MATERIAL	1953-1978, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class A-1 Barge
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	None
21.	HELIPAD (yes/no)	Open deck available for helipad
22.	ICE STRENGTHENING (yes/no)	5% ice class
23.	MISCELLANEOUS FEATURES	None

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	50% of barges have tanks for fuel, ballast water
25.	ADDITIONAL PASSENGER BERTHS	100-200
26	CONTAINER CAPACITY (size, weight)	250-950 TEU, 3000-11,400 tonnes
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	Adaptable
29.	LARGEST PORTABLE CRANE MOUNTABLE	Revolving, 200-400 tonnes @ 25-40 m (83-132 ft) radius
30.	UNDERWAY REPLENISHMENT (yes/no)	No
31.	OTHER POSSIBLE FEATURES	Heavy lift capability

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	Round (spoon shaped) max. tow speed = 10.5 Knots; Ship shaped max.tow spd.= 12 Kts; flat slab max.tow spd. = 6 Knots
33.	COMPARTMENTATION BELOW DECK	Longitudinals and transverse bulkheads
34.	TYPE OF SKEGS	70% fixed skegs
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY TUG AND BARGE

VESSEL TYPE OCEAN SERVICE BARGE CLASS RO/RO TRAILER BARGE

APPROXIMATE NO. IN SERVICE 9

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Load and transport 40-foot roll-on/ roll-off trailers
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 122-177 m (400-580 ft) Beam 30-31 m (100-105 ft) Depth 6-18 m (20-57 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Non-propelled
4.	CRUISING/MAXIMUM SPEEDS	12 Knots w/7200 HP Tug, good weather
5.	ENDURANCE (days / miles) AT ABOVE SPEEDS	None
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	Passenger accommodations built into triple deck barges for 2-man riding crew
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 10
8.	VESSEL MANEUVERABILITY	None
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	2000-4000 tonnes 8000-20,000 m^3, (282,400-706,000 ft^3) dry
10.	DRY STORES CAPACITY	None
11.	REEFER CAPACITY	8000-20,000 m^3, 2000-4000 tonnes
12.	CLEAR CARGO AREA (on deck / below deck)	3370-5370 m^2 (36,400-58,000 ft^2) on deck only
13.	AVERAGE DECK STRENGTH	7500 kg/m^2 (1536 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Container tie-downs and fifth wheel stands provided
15.	NAVIGATION / COMMUNICATION EQUIPMENT INSTALLED	None
16.	YEAR BUILT, HULL MATERIAL	1970-1978, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class, Barge, Ocean Towing
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	Upper deck available for helipad
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	Barges lock into apron ramps for loading/ unloading

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	3600-11,000 m^3 (127,080-385,000 ft^3) double bottom
25.	ADDITIONAL PASSENGER BERTHS	None
26.	CONTAINER CAPACITY (size, weight)	180-374 trailers @ 12.5 m (40 ft) 3600-7500 tonnes
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	Heavy lifts as necessary
29.	LARGEST PORTABLE CRANE MOUNTABLE	Revolving, 200-400 tonnes @ 25-30 m (83-99 ft) radius
30.	UNDERWAY REPLENISHMENT (yes/no)	No
31.	OTHER POSSIBLE FEATURES	Fifth wheel stands can be removed. Triple deck barge towed with 2 wires for added security

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	Round (spoon) and ship shaped
33.	COMPARTMENTATION BELOW DECK	Longitudinals 5-15 water tight bulkheads
34.	TYPE OF SKEGS	Fixed
35.	MISCELLANEOUS FEATURES	Some single, double, and triple decks used in Gulf Coast-Puerto Rico service

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY TUG AND BARGE

VESSEL TYPE OCEAN SERVICE BARGE CLASS TANK BARGE

APPROXIMATE NO. IN SERVICE 53

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Lightering, bunkering, transportation of petroleum and liquid products
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 76-131 m (250-430 ft) Beam 23-30 m (76-100 ft) Depth 4-7 m (16-25 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Non-propelled
4.	CRUISING/MAXIMUM SPEEDS	6-12 Knots towed
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	None
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	5-15 tankermen needed to load/offload
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 10
8.	VESSEL MANEUVERABILITY	None
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	5900-18,000 m^3 (208,270-635,400 ft^3) in tanks
10.	DRY STORES CAPACITY	None
11.	REEFER CAPACITY	None
12.	CLEAR CARGO AREA (on deck/below deck)	None
13.	AVERAGE DECK STRENGTH	6000 kg/m^2 (1228 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Diesel powered liquid cargo pumps: 6600-9700 gpm
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	None
16.	YEAR BUILT, HULL MATERIAL	1969-1976, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class, Ocean Service, Oil Barge
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No, but can be fitted
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	None

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	May be converted to carry non-corrosive liquid
25.	ADDITIONAL PASSENGER BERTHS	None
26.	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	None
29.	LARGEST PORTABLE CRANE MOUNTABLE	Gantry, 130 tonnes, 12 m (40 ft) radius
30.	UNDERWAY REPLENISHMENT (yes/no)	No
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY TUG AND BARGE

VESSEL TYPE OCEAN SERVICE BARGE CLASS HOUSE BARGE

APPROXIMATE NO. IN SERVICE 10

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Transport containers and dry deck cargo under cover in Gulf of Mexico and Caribbean
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 113-122 m (372-400 ft) Beam 20-30 m (68-100 ft) Depth 5-6 m (18-20 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Non-propelled
4.	CRUISING / MAXIMUM SPEEDS	6-12 Knots depending on tow HP
5.	ENDURANCE (days / miles) AT ABOVE SPEEDS	None
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	None
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 9
8.	VESSEL MANEUVERABILITY	None
9.	CARGO DEADWEIGHT (on deck / below deck), NET CUBIC CAPACITY (dry / liquid)	5500-11,400 tonnes 800-19,000 m^3 (282,400-670,700 ft^3)
10.	DRY STORES CAPACITY	Housed volume: 8000-19,000 m^3
11.	REEFER CAPACITY	None
12.	CLEAR CARGO AREA (on deck / below deck)	2000-4000 m^2 (21,600-43,200 ft^2) on deck only
13.	AVERAGE DECK STRENGTH	7000 kg/m^2 (1434 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Deck timbered for vehicles
15.	NAVIGATION / COMMUNICATION EQUIPMENT INSTALLED	None
16.	YEAR BUILT, HULL MATERIAL	1970-1976, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class, A-1 Barge
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No, but can be fitted
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	Average deck house: 7-8 m (23-26 ft) high; doors measure 5-5x5-6 m (17-20x17-20 ft).

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	11,000-22,000 m^3 (388,300 ft^3) in hull
25.	ADDITIONAL PASSENGER BERTHS	100-200
26.	CONTAINER CAPACITY (size, weight)	200-500 TEU, 2400-6000 tonnes
27.	MAINTENANCE AND REPAIR FACILITIES	Adaptable for housed repairs, machine shops
28.	SPECIAL CARGO CARRIAGE	Possible
29.	LARGEST PORTABLE CRANE MOUNTABLE	Revolving 200-400 tonnes @ 25-40 m (82-132 ft) radius
30.	UNDERWAY REPLENISHMENT (yes/no)	No
31.	OTHER POSSIBLE FEATURES	Deck stiffened for crane. Deck houses with full height doors

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	Round
33.	COMPARTMENTATION BELOW DECK	Longitudinal framing, 5-15 watertight bulkheads
34.	TYPE OF SKEGS	Fixed
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY TUG AND BARGE

VESSEL TYPE OCEAN SERVICE BARGE CLASS ICE-BREAKING BARGE

APPROXIMATE NO. IN SERVICE 1

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Ice-breaking and carriage of liquid cargo
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 94.5 m (310 ft) Beam 32 m (104.4 ft) Depth 5.9 m (19.3 ft) Lookout conning tower elevated 22 m (73 ft) above keel
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Non-propelled, 9000 BHP tugboats required to push
4.	CRUISING/MAXIMUM SPEEDS	12 knots maximum
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	None
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	None
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 11
8.	VESSEL MANEUVERABILITY	None
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	8640 tonnes on deck, 9500 m^3 (335,350 ft^3) liquid cargo
10.	DRY STORES CAPACITY	14,000 m^3, 4500 tonnes (494,200 ft^3)
11.	REEFER CAPACITY	None
12.	CLEAR CARGO AREA (on deck/below deck)	2100 m^2 (22,680 ft^2) on deck only
13.	AVERAGE DECK STRENGTH	10,000 kg/m^2 (2048 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Pumps for liquid cargo
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	None
16.	YEAR BUILT, HULL MATERIAL	1976, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class, A-1 Barge
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	Open deck available for helipad
22.	ICE STRENGTHENING (yes/no)	Yes
23.	MISCELLANEOUS FEATURES	2 tow wires, pumps, generators, deck winches

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Conversion for non-corrosive liquids possible
25.	ADDITIONAL PASSENGER BERTHS	None
26.	CONTAINER CAPACITY (size, weight)	350 TEU, 4500 tonnes
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	As needed
29.	LARGEST PORTABLE CRANE MOUNTABLE	Gantry, 130 tonnes @ 12m (40 ft)
30.	UNDERWAY REPLENISHMENT (yes/no)	No
31.	OTHER POSSIBLE FEATURES	Heavy lift capability

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	Ship shaped
33.	COMPARTMENTATION BELOW DECK	Longitudinal framing; 7 transverse 13 longitudinal watertight bulkheads; 27 tanks
34.	TYPE OF SKEGS	Fixed
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY TUG AND BARGE

VESSEL TYPE INTEGRATED TUG-BARGE CLASS

APPROXIMATE NO. IN SERVICE 10

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Transport of bulk materials, products
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length combined 120-305 m (394-1000 ft) Beam 24-32 m (78-105 ft) Depth 6-14 m (20-47 ft) Draft 4.3-12 m (14-39 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel 12,000-15,000 BHP, No. 2 diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	8-15 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	4-12 days/1000-4000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	15-20 crew, 15-20 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 8
8.	VESSEL MANEUVERABILITY	Bow thruster on barge, all tugs are twin screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	40,000-100,000 tonnes 40,000- 60,000 m^3 (1,412,000-2,118,000 ft^3)
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	Cargo piping obstructs deck space
13.	AVERAGE DECK STRENGTH	12,500 kg/m^2 (2500 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Liquid cargo pumps: 1600-10,000 gpm. Bulk cargo pumps: 50-200/min
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Radar; LORAN; autopilot; gyro-magnetic compass AM/FM/SSB radios
16.	YEAR BUILT, HULL MATERIAL	1950-1978, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class, A-1 Barge, Unlimited Towing; USCG certificated.
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	Yes, CO^2 system w/monitors
20.	TOW WINCH (yes/no), BOLLARD PULL	Yes, 100-150 tonnes
21.	HELIPAD (yes/no)	No, but can be fitted
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	2-3 winches @ 2 tonnes pull between tug and barge

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	3000-20,000 m^3 (105,900-706,000 ft^3) in barge double bottom
25.	ADDITIONAL PASSENGER BERTHS	5-10
26	CONTAINER CAPACITY (size, weight)	400-800 TEU, 4800-9600 tonnes
27	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	Ore, Coal, Limestone, Grain, Oil
29	LARGEST PORTABLE CRANE MOUNTABLE	Gantry, 130 tonnes @ 12 m (40 ft)
30.	UNDERWAY REPLENISHMENT (yes/no)	No
31.	OTHER POSSIBLE FEATURES	Heavy lift capability

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY CRANE/DERRICK BARGE

VESSEL TYPE HEAVY LIFT BARGE CLASS 1000-2000 Tonnes

APPROXIMATE NO. IN SERVICE ?

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Heavy lifts at sea, generally in support of the offshore oil industry
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 122-125 m (400-410 ft) Beam 42-44 m (140-146 ft) Depth 7.62 m (25 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Non-propelled, tow required; auxiliary diesel power for equipment
4.	CRUISING/MAXIMUM SPEEDS	None
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	None
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	150-200 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 3
8.	VESSEL MANEUVERABILITY	None
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	2000-4000 tonnes on deck
10.	DRY STORES CAPACITY	60 days consumables
11	REEFER CAPACITY	60 days consumables
12.	CLEAR CARGO AREA (on deck/below deck)	2000-2200 m^2 (21,600-23,760 ft^2) on deck
13.	AVERAGE DECK STRENGTH	91,200 kg/m^2 (18,600 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Boom length 74.7 m (425 ft)
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	VHF, SSB radios
16.	YEAR BUILT, HULL MATERIAL	1940-1978, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class, Barge
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	Generally improvised
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	None

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Ballast/double bottom volume 25,000-33,000 m^3 (882,500-1,164,900 ft^3)
25.	ADDITIONAL PASSENGER BERTHS	50-80
26.	CONTAINER CAPACITY (size, weight)	250-330 TEU, 3000-4000 tonnes
27.	MAINTENANCE AND REPAIR FACILITIES	Extensive
28.	SPECIAL CARGO CARRIAGE	None
29.	LARGEST PORTABLE CRANE MOUNTABLE	Crawler, 200 tonnes capacity
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	Generally have supporting mobile cranes on deck up to 220 tonnes capacity

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY CRANE/DERRICK BARGE

VESSEL TYPE HEAVY LIFT BARGE CLASS 500-999 Tonnes

APPROXIMATE NO. IN SERVICE 18

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Heavy lifts at sea and inshore, to support marine construction business
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 60-136 m (200-448 ft) Beam 21-30 m (70-100 ft) Depth 4-13 m (14-45 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Non-propelled, tow required; auxiliary diesel power for equipment
4.	CRUISING/MAXIMUM SPEEDS	None
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	None
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	54-218 total accommodations
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 3
8.	VESSEL MANEUVERABILITY	None
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	2000-3000 tonnes on deck
10.	DRY STORES CAPACITY	30-60 days consumables
11.	REEFER CAPACITY	30-60 days consumables
12.	CLEAR CARGO AREA (on deck/below deck)	500-1600 m^2 (5400-17,280 ft^2) on deck
13.	AVERAGE DECK STRENGTH	61,600 kg/m^2 (12,600 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Boom lengths range 38-75 m (125-245 ft)
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	VHF, SSB radios
16.	YEAR BUILT, HULL MATERIAL	1940-1978, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class, Barge
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	Generally improvised (Pipelaying Barges fitted)
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	None

B. VESSEL ADAPTABILITY

No.	Item	
24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Ballast/double bottom volume 4000-16,000 m^3 (141,200-564,800 ft^3)
25.	ADDITIONAL PASSENGER BERTHS	50-60
26.	CONTAINER CAPACITY (size, weight)	160-250 TEU, 2000-3000 tonnes
27.	MAINTENANCE AND REPAIR FACILITIES	Extensive
28.	SPECIAL CARGO CARRIAGE	None
29.	LARGEST PORTABLE CRANE MOUNTABLE	150 tonnes
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

No.	Item	
32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

No.	Item	
36.	CAPACITY IN EACH MODE	Revolving cranes used in fixed mode: 1000-1200 tonnes

E. DREDGE CHARACTERISTICS ONLY

No.	Item	
37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY CRANE/DERRICK BARGE

VESSEL TYPE BARGE CLASS 250-499 Tonnes

APPROXIMATE NO. IN SERVICE 7

CANDIDATE VESSEL CHARACTERISTICS

A GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Provide heavy lift service at sea and inshore
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 48-92 m (158-301 ft) Beam 23-30 m (78-98 ft) Depth 3-6.7m (10-22 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Non-propelled, tow required; auxiliary diesel power for equipment
4.	CRUISING/MAXIMUM SPEEDS	None
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	None
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	12 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 3
8.	VESSEL MANEUVERABILITY	None
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	1000-1600 tonnes on deck
10.	DRY STORES CAPACITY	30 days consumables
11.	REEFER CAPACITY	30 days consumables
12.	CLEAR CARGO AREA (on deck/below deck)	440-1100 m^2 on deck (4752-11,880 ft^2) on deck
13.	AVERAGE DECK STRENGTH	36,910 kg/m^2 (7560 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Boom lengths range 42-58 m (140-190 ft)
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	VHF, SSB radios
16.	YEAR BUILT, HULL MATERIAL	1940-1978, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class, Barge
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No, but can be added
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	None

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Ballast/double bottom volume 2200-9000 m^3 (77,660-317,700 ft^3)
25.	ADDITIONAL PASSENGER BERTHS	20-30
26	CONTAINER CAPACITY (size, weight)	80-130 TEU, 1000-1600 tonnes
27.	MAINTENANCE AND REPAIR FACILITIES	Field tools, turning and welding equipment
28.	SPECIAL CARGO CARRIAGE	None
29	LARGEST PORTABLE CRANE MOUNTABLE	None
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	Some heavy lifts stowage

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	90% revolving type: 250-450 tonnes 10% shear leg or A-frame Revolving cranes used in fixed mode: 500-800 tonnes

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY CRANE/DERRICK BARGE

VESSEL TYPE BARGE CLASS 100-249 Tonnes

APPROXIMATE NO. IN SERVICE 30

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Heavy lifts in marine construction both at sea and inshore
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 41-122 m (135-400 ft) Beam 14-27 m (46-90 ft) Depth 3-6 m (10-19 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Non-propelled, tow required, auxiliary diesel power for equipment
4.	CRUISING/MAXIMUM SPEEDS	None
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	None
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	10-60 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 3
8.	VESSEL MANEUVERABILITY	None
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	400-800 tonnes on deck
10.	DRY STORES CAPACITY	30 days consumables
11.	REEFER CAPACITY	30 days consumables
12.	CLEAR CARGO AREA (on deck/below deck)	230-1300 m^2 (2484-14,040 ft^2) on deck
13.	AVERAGE DECK STRENGTH	13,400 kg/m^2 (2755 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Boom lengths range 33-67 m (110-220 ft)
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	VHF, SSB radios
16.	YEAR BUILT, HULL MATERIAL	1940-1978, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class, Barge
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No, but can be added
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	Some booms can be operated in fixed mode

B VESSEL ADAPTABILITY

24	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Ballast/double bottom volume [illegible]-10,000 m^3 (38,830-353,000 ft^3)
25	ADDITIONAL PASSENGER BERTHS	50-60
26	CONTAINER CAPACITY (size, weight)	20-65 TEU, 400-800 tonnes
27	MAINTENANCE AND REPAIR FACILITIES	Field tools, turning and welding equipment
28	SPECIAL CARGO CARRIAGE	None
29	LARGEST PORTABLE CRANE MOUNTABLE	None
30	UNDERWAY REPLENISHMENT (yes/no)	Yes
31	OTHER POSSIBLE FEATURES	1 A-frame crane, 29 with revolving crane(s)

C. BARGE CHARACTERISTICS ONLY

32	CONFIGURATION OF BOW	
33	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	100-250 tonnes revolving, additional 50-75 tonnes in fixed mode (non-revolving)

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY OFFSHORE SERVICE AND SUPPLY

VESSEL TYPE CREW BOAT CLASS 30-40 m (100-130 ft)

APPROXIMATE NO. IN SERVICE 165

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Offshore oil field passenger service
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 30-40 m (100-130 ft) Beam 8-12 m (26-40 ft) Depth 3-4 m (10-13 ft) Draft 1.5-2.5 m (5-8 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel 1700-3600 BHP, No. 2 diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	14-25/28-40 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	2-6 days/800-1200 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	3,6 berths total, 55-70 passengers seated
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 7
8	VESSEL MANEUVERABILITY	Highly maneuverable, twin screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	20 tonnes, 50-150/30-100 m^3 (1765-5295/1059-3530 ft^3)
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	100-125 m^2 (1080-1350 ft^2) on deck only
13.	AVERAGE DECK STRENGTH	1250 kg/m^2 (256 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	No cargo gear fitted
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	LORAN; radar; RDF; fathometer; autopilot, SSB, VHF radios; electric hydraulic steering
16.	YEAR BUILT, HULL MATERIAL	1968-1978, aluminum
17.	CLASSIFICATION SOCIETY STATUS	ABS Class, A-1 Passenger Service
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	None

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Conversion of ballast tanks for fuel [illegible] result in [illegible] tons
25.	ADDITIONAL PASSENGER BERTHS	20-20 seats
26.	CONTAINER CAPACITY (size, weight)	No
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	Small package only
29.	LARGEST PORTABLE CRANE MOUNTABLE	No
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK / CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY OFFSHORE SUPPLY

VESSEL TYPE CREW BOAT CLASS 26-30 m (85-99 ft)

APPROXIMATE NO. IN SERVICE 90

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Offshore oil field passenger service
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 26-30 m (85-99 ft) Beam 6-8 m (20-26 ft) Depth 2-3 m (7-10 ft) Draft 1.8-2.5 m (6-8 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 1000-3000 BHP, No. 2 diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	14-18/25-28 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	1-4 days/400-600 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	2-3, 5 berths total 30-60 passengers seated
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 7
8.	VESSEL MANEUVERABILITY	Highly maneuverable, twin screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	10 tonnes on deck only, 50-100/25-80 m^3 (1765-3530/882-2824 ft^3)
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	45-55 m^2 (486-594 ft^2) on deck only
13.	AVERAGE DECK STRENGTH	1250 kg/m^2 (256 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	No cargo gear fitted
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Radio; RDF; autopilot; radar; LORAN; fathometer; electric hydraulic steering
16.	YEAR BUILT, HULL MATERIAL	1968-1978, aluminum
17.	CLASSIFICATION SOCIETY STATUS	ABS Class A-1 Passenger Service
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None, salt water (washdown) only
19.	EXTERNAL FIREFIGHTING CAPABILITY	None, but can be fitted
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	None

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	No
25.	ADDITIONAL PASSENGER BERTHS	20-40 seats
26.	CONTAINER CAPACITY (size, weight)	No
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	Small package capacity
29.	LARGEST PORTABLE CRANE MOUNTABLE	No
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY OFFSHORE SERVICE AND SUPPLY

VESSEL TYPE CREW BOAT CLASS 18-26 m (60-84 ft)

APPROXIMATE NO. IN SERVICE 220

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Offshore oil field passenger service
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 18-26 m (60-84 ft) Beam 6-8 m (20-26 ft) Depth 2-3 m (7-10 ft) Draft 1-2 m (3-6 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 500-1200 BHP, No. 2 diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	10-16/12-23 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	1-2 days/200-400 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	2-3, 2-3 berths total, 25-40 passengers seated
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 5
8.	VESSEL MANEUVERABILITY	Highly maneuverable, twin screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	5 tonnes, 50-100/25-60 m^3 (1765-3530/882-2118 ft^3) on deck only
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	20-40 m^2 (216-432 ft^2) on deck only
13.	AVERAGE DECK STRENGTH	1500 kg/m^2 (300 lb / ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	No cargo gear fitted
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Radio, LORAN, radar, magnetic compass electric hydraulic steering
16.	YEAR BUILT, HULL MATERIAL	1965-1978, aluminum
17.	CLASSIFICATION SOCIETY STATUS	40% ABS Class, A-1, Passenger Service
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None, salt water washdown only
19.	EXTERNAL FIREFIGHTING CAPABILITY	None, but can be fitted
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	None

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	No
25.	ADDITIONAL PASSENGER BERTHS	None
26.	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	Small package capacity
29.	LARGEST PORTABLE CRANE MOUNTABLE	No
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY OFFSHORE SERVICE AND SUPPLY

VESSEL TYPE UTILITY BOAT CLASS 18-37 m (60-120 ft)

APPROXIMATE NO. IN SERVICE 230

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Offshore oil field utility standby, limited personnel carrier
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 18-37 m (60-120 ft) Beam 7-8 m (20-25 ft) Depth 2-3 m (7-10 ft) Draft 1.5-2 m (5-7 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 300-2000 BHP, No. 2 diesel fuel
4.	CRUISING / MAXIMUM SPEEDS	8-11/12-15 Knots
5.	ENDURANCE (days / miles) AT ABOVE SPEEDS	1-7 days/5000 miles maximum
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	1-4 crew, 5-20 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 5
8.	VESSEL MANEUVERABILITY	10% bow thruster, 80% twin screw
9.	CARGO DEADWEIGHT (on deck / below deck), NET CUBIC CAPACITY (dry / liquid)	15-20 tonnes on deck only, 55-132 m^3 (1941-4660 ft^3) liquid
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck / below deck)	100-2000 m^2 (1080-2160 ft^2) on deck only
13.	AVERAGE DECK STRENGTH	1200 kg/m^2 (246 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Anchor winch; 5-tonne capacity hydraulic capstan on after deck
15.	NAVIGATION / COMMUNICATION EQUIPMENT INSTALLED	Radar, radio, fathometer, g magnetic compass
16.	YEAR BUILT, HULL MATERIAL	1960-1978, steel
17.	CLASSIFICATION SOCIETY STATUS	10% built to ABS class
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None, salt water washdown only
19.	EXTERNAL FIREFIGHTING CAPABILITY	Yes, diesel powered foam pump, 300-400 m^3
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No
22	ICE STRENGTHENING (yes/no)	No
23	MISCELLANEOUS FEATURES	None

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Ballast tank conversion
25.	ADDITIONAL PASSENGER BERTHS	8-10
26.	CONTAINER CAPACITY (size, weight)	1-2 TEU, 12-24 tonnes
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	Stern of vessel reinforced for towing and anchor handling
29.	LARGEST PORTABLE CRANE MOUNTABLE	No
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY OFFSHORE SERVICE & SUPPLY

VESSEL TYPE TOWING AND SUPPLY BOAT CLASS 61-66 m (200-218 ft)

APPROXIMATE NO. IN SERVICE 55

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Offshore oil field supply and towing
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 61-66 m (200-218 ft) Beam 12-24 m (40-44 ft) Depth 4-6 m (16-20 ft) Draft 4-5 m (14-16 ft) Height 18-23 m (60-75 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 5000 - 10,340 BHP, No. 2 diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	12-14/15-17 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	30-40 days/10,000-15,000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	9 crew, 20-25 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 11
8.	VESSEL MANEUVERABILITY	500-600 HP bow thruster, twin screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	500-650 tonnes on deck only 100-200/1500-2000 m^3 (3530-7060/52950-70600 ft^3)
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	20-30 m^3 (700-1060 ft^3)
12.	CLEAR CARGO AREA (on deck/below deck)	350-400 m^2 (3780-4320 ft^2) on deck only
13.	AVERAGE DECK STRENGTH	2500 kg/m^2 (512 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Diesel-powered double-drum winch, 160-200 tonnes line pull
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Radar, LORAN, RDF, AM/FM, fathometer, gyromagnetic compass, autopilot
16.	YEAR BUILT, HULL MATERIAL	1970-1978, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS A-1 Towing, AMS or equal
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None, salt water washdown only
19.	EXTERNAL FIREFIGHTING CAPABILITY	Yes, diesel powered foam pump, 200-250 m^3/h
20.	TOW WINCH (yes/no), BOLLARD PULL	Yes, 80-105 tonnes
21.	HELIPAD (yes/no)	No, but can be fitted
22.	ICE STRENGTHENING (yes/no)	90[illegible] ice class
23.	MISCELLANEOUS FEATURES	Stern roller, dry bulk mud tanks w/air compressors have liquid discharge capability.

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Ballast and pressure tanks can be converted
25.	ADDITIONAL PASSENGER BERTHS	10-20
26.	CONTAINER CAPACITY (size, weight)	30 TEU, 600 tonnes
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	After deck strengthened for anchor handling
29.	LARGEST PORTABLE CRANE MOUNTABLE	A-frame on gantry, 60 tonnes @ 10-15 m @ radius (33-50 ft)
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	Firefighting capability, diesel driven pumps 200-250 m^3/h foam discharge units

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY OFFSHORE SERVICE AND SUPPLY

VESSEL TYPE TOWING AND SUPPLY BOAT CLASS 58.5-59 m (192-194 ft)

APPROXIMATE NO. IN SERVICE 45

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Offshore oil field towing and supply
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 58.5-59 m (192-194 ft) Beam 10-15 m (32-42 ft) Depth 5-6 m (17-20 ft) Draft 4-5 m (14-16 ft) Height 15-20 m (50-70 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 4000-7012 BHP, No. 2 diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	12-14/13-16 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	30-40 days/10,000-13,000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	9 crew, 20-25 berths totla
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 11
8.	VESSEL MANEUVERABILITY	300-600 HP bow thruster twin screw, Kort nozzles
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	400-600 tonnes 100-200/150-200 m^3 (3530-7060/5295-7060 ft^3)
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	20-30 m^3 (700-1060 ft^3)
12.	CLEAR CARGO AREA (on deck/below deck)	300-500 m^2 (3240-3780 ft^2) on deck only
13.	AVERAGE DECK STRENGTH	2500 kg/m^2 (512 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Diesel-powered double-drum winch with (2) 900-1300 m (2970-4290 ft) of 6 cm (2.3 in) wire
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Radar, gyromagnetic compass, AM/FM, RDF, fathometer, LORAN or Decca, autopilot
16.	YEAR BUILT, HULL MATERIAL	1972-1978, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS, Lloyds 100 A1,
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None, salt water washdown only
19.	EXTERNAL FIREFIGHTING CAPABILITY	Yes, 4-6 stations w/hose and nozzles
20.	TOW WINCH (yes/no), BOLLARD PULL	Yes, 50-80 tonnes
21.	HELIPAD (yes/no)	No, but can be fitted
22.	ICE STRENGTHENING (yes/no)	30% ice class
23.	MISCELLANEOUS FEATURES	Stern roller for anchor handling

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Additional 360-480 m^3 (12,708-16,944 ft^3)
25.	ADDITIONAL PASSENGER BERTHS	15-20
26.	CONTAINER CAPACITY (size, weight)	30-40 TEU, 360-480 tonnes
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	Can carry liquid cargoes and fuels in pressure tanks
29.	LARGEST PORTABLE CRANE MOUNTABLE	A-frame on gantry, 20-25 tonnes @ 6-7 m (20-23 ft) radius
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	Cargo transfer capacities: Diesel fuel: 440-660 gpm Drill water: 440-550 gpm Bulk: 500-750 m^3/h

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY OFFSHORE SERVICE AND SUPPLY

VESSEL TYPE TOWING AND SUPPLY BOAT CLASS 56-58 m (185-190 ft)

APPROXIMATE NO. IN SERVICE 43

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Offshore oil field supply and towing
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 56-58 m (185-190 ft) Beam 10-13 m (30-42 ft) Depth 5-6 m (19-20 ft) Draft 4-5 m (15-16 ft) Height 15-23 m (50-75 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 3000-6000 BHP, No. 2 diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	12-15/14-17 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	20-30 days/8000-10,000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	7-10 crew, up to 22 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 10
8.	VESSEL MANEUVERABILITY	200-500 HP bow thruster, twin screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	400-600 tonnes on deck only, 100-150/1500-2000 m^3 (3530-5295/52950-70600 ft^3)
10.	DRY STORES CAPACITY	15-20 m^3 (530-700 ft^3)
11.	REEFER CAPACITY	20-30 m^3 (700-1000 ft^3)
12.	CLEAR CARGO AREA (on deck/below deck)	300-4000 m^2 (3200-4300 ft^2) on deck only
13.	AVERAGE DECK STRENGTH	2270 kg/m^2 (465 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Diesel-driven double-drum winch with (2) 900-1300 m (2970-4290 ft) of 6 cm (2.3 in) wire
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Radar, fathometer, radio, gyromagnetic compass, RDF, autopilot
16.	YEAR BUILT, HULL MATERIAL	1970-1978,1972-1974 average, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class, A-1 Towing or equal
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None, salt water washdown only
19.	EXTERNAL FIREFIGHTING CAPABILITY	Yes, 4-6 fire stations w/hose and nozzles
20.	TOW WINCH (yes/no), BOLLARD PULL	Yes, 40-70 tonnes
21.	HELIPAD (yes/no)	No, but may be fitted
22.	ICE STRENGTHENING (yes/no)	30% ice class
23.	MISCELLANEOUS FEATURES	Stern roller for anchor handling

B VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	100-200 m^3 (3530-7060 ft^3) capacity in pressure tanks
25.	ADDITIONAL PASSENGER BERTHS	15-20
26.	CONTAINER CAPACITY (size, weight)	30-50 TEU, 360-600 Tonnes
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	Stern of vessels specifically re-inforced for towing and anchor handling
29.	LARGEST PORTABLE CRANE MOUNTABLE	A-frame on gantry, 40 tonnes @ 5-10 m (17-33 ft) radius
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	300-400 KW from ship's generators

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY OFFSHORE SERVICE & SUPPLY

VESSEL TYPE TOWING AND SUPPLY BOAT CLASS 55 m (180 ft)

APPROXIMATE NO. IN SERVICE 70

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Offshore oil field supply and towing
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 55 m (180 ft) Beam 11.6 m (38 ft) Depth 4-5 m (15-16 ft) Draft 3-4 m (12-13 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 2400-5000 BHP, No. 2 diesel fuel
4.	CRUISING / MAXIMUM SPEEDS	12-15/14-17 Knots
5.	ENDURANCE (days / miles) AT ABOVE SPEEDS	20-30 days/8000-11,000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	7-9 Crew, 18-20 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 10
8.	VESSEL MANEUVERABILITY	200-600 HP bow thruster, twin screw
9.	CARGO DEADWEIGHT (on deck / below deck), NET CUBIC CAPACITY (dry / liquid)	400-500 tonnes, 1000-1500/1000-1500 m^3 (35,300-52,950/35,300-52,950 ft^3)
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	15-25 m3 (500-900 ft^3)
12.	CLEAR CARGO AREA (on deck / below deck)	250-360 m^2 (2675-3850 ft^2) on deck only
13.	AVERAGE DECK STRENGTH	2500 kg/m^2 (512 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Diesel powered double drum winch with (2) 800 m (2640 ft) of 5 cm (2 in.) wire.
15.	NAVIGATION / COMMUNICATION EQUIPMENT INSTALLED	Radar, RDF, magnetic compass, fathometer, autopilot, VHF radio
16.	YEAR BUILT, HULL MATERIAL	1967-1978, Steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class, A-1 Towing
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None salt water washdown only
19.	EXTERNAL FIREFIGHTING CAPABILITY	Yes, fire hose fittings
20.	TOW WINCH (yes/no), BOLLARD PULL	Yes, 30-40 tonnes
21.	HELIPAD (yes/no)	No, but can be fitted
22.	ICE STRENGTHENING (yes/no)	30% ice class
23.	MISCELLANEOUS FEATURES	Stern rollers, stabilization tanks

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Yes. Proven ability to carry liquid flammable cargoes
25.	ADDITIONAL PASSENGER BERTHS	None
26	CONTAINER CAPACITY (size, weight)	30-40 TEU, 360-480 tonnes
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	Pressure tanks for cement, drill water, rig fuel
29	LARGEST PORTABLE CRANE MOUNTABLE	A-frame on gantry, 40 tonnes @ 5-10 m (17-33 ft) outreach
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	All w/auxiliary engines, 150 KW average.

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY OFFSHORE SERVICE & SUPPLY

VESSEL TYPE TOWING & SUPPLY BOAT CLASS 52-53.5 m (170-175 ft)

APPROXIMATE NO. IN SERVICE 57

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS (Show Range)

1.	NORMAL SERVICE FUNCTIONS	Offshore oil field supply and towing
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 52-53.5 m (170-175 ft) Beam 10-12 m (35- 40 ft) Depth 3.5-5 m (12- 16 ft) Draft 3-4.5 m (10- 14 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 2000-5000 BHP, No. 2 diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	12-13 / 14-16 knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	20-30 days / 5000-9000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	7-12 crew, 10-12 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 10
8.	VESSEL MANEUVERABILITY	Bow thruster, twin screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	400-500 tonnes, 500-1000/1000-1500 m^3 (17,650-35,300/35,300-52,950 ft^3)
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	200-300 m^2 (2160-3240 ft^2) on deck only
13.	AVERAGE DECK STRENGTH	2270 kg/m^2 (465 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Diesel-powered winch with (2) 800 m (2640 ft) of 5 cm (2 in) wire
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Radar; RDF; autopilot; VHF,AM,SSB radios; fathometer; gyro-magnetic compass.
16.	YEAR BUILT, HULL MATERIAL	1966-1978, 1972 average, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class,A-1 Towing, AMS
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None, salt water wash down only
19.	EXTERNAL FIREFIGHTING CAPABILITY	Yes, fire hose fittings
20.	TOW WINCH (yes/no), BOLLARD PULL	Yes, 30-60 tonnes
21.	HELIPAD (yes/no)	No, but can be fitted
22.	ICE STRENGTHENING (yes/no)	40% ice class
23.	MISCELLANEOUS FEATURES	Stern rollers for anchor handling

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Yes, pressure tanks may be used for flammable liquid
25.	ADDITIONAL PASSENGER BERTHS	None
26.	CONTAINER CAPACITY (size, weight)	30-40, 360-480 tonnes
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	Bulk mud and cement
29.	LARGEST PORTABLE CRANE MOUNTABLE	Hydraulic boom, 15-20 tonnes at 5-10 m (17-33 ft) radius
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	Cargo pump capacities, fuel oil: 77 tonnes/h drill/ballast water: 80 tonnes/h fire fighting pump: 45 tonnes/h

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY OFFSHORE SERVICE & SUPPLY

VESSEL TYPE TOWING & SUPPLY BOAT CLASS 41-51.5 m (135-169 ft)

APPROXIMATE NO. IN SERVICE 170

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Offshore oil field supply and towing
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 41-51.5 m (135-169 ft) Beam 10-12 m (34- 40 ft) Depth 3-4 m (10- 14 ft) Draft 2-3 m (7-10 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 1700 - 5750 BHP, No. 2 diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	10-13/12-15 knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	10-35 days/2500-9000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	5-7 crew, 12-19 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 10
8.	VESSEL MANEUVERABILITY	Bow thrusters, twin screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	450-500 tonnes, 1000 - 2000/500-1000 m^3 (35,300-70,600/17,650-35,300 ft^3)
10.	DRY STORES CAPACITY	Consumables, 1-5 tonnes
11.	REEFER CAPACITY	10-15 m^3 (353-530 ft^3)
12.	CLEAR CARGO AREA (on deck/below deck)	150-350 m^2 (1620-3780 ft^2) on deck only
13.	AVERAGE DECK STRENGTH	2000 kg/m^2 (410 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Diesel-powered double-drum winch with (2) 650-700 m (2145-2310 ft) of 5 cm (2 in) wire
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Radar, RDF, radio, fathometer, gyro-magnetic compass, autopilot
16.	YEAR BUILT, HULL MATERIAL	1960-1978; 1968-1974 average; steel
17.	CLASSIFICATION SOCIETY STATUS	90% ABS Class, AMS
18	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None, salt water washdown only
19.	EXTERNAL FIREFIGHTING CAPABILITY	Yes, fire hose fittings
20.	TOW WINCH (yes/no), BOLLARD PULL	Yes, 30-40 tonnes
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	20% ice class
23.	MISCELLANEOUS FEATURES	Stern roller for anchor handling, welding equipment

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Fuel oil capacity may be doubled w/conversion
25.	ADDITIONAL PASSENGER BERTHS	10-15
26	CONTAINER CAPACITY (size, weight)	40 TEU, 480 tonnes
27.	MAINTENANCE AND REPAIR FACILITIES	New boats have welding equipment and tools
28.	SPECIAL CARGO CARRIAGE	Drilling rig water, 63,000 gals
29.	LARGEST PORTABLE CRANE MOUNTABLE	Hydraulic boom, 10-20 tonnes @ 5-8 m (17-26 ft) radius
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	All vessels have some liquid transfer capabilities, bulk cargo air compressor 10-15 m^3/min

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

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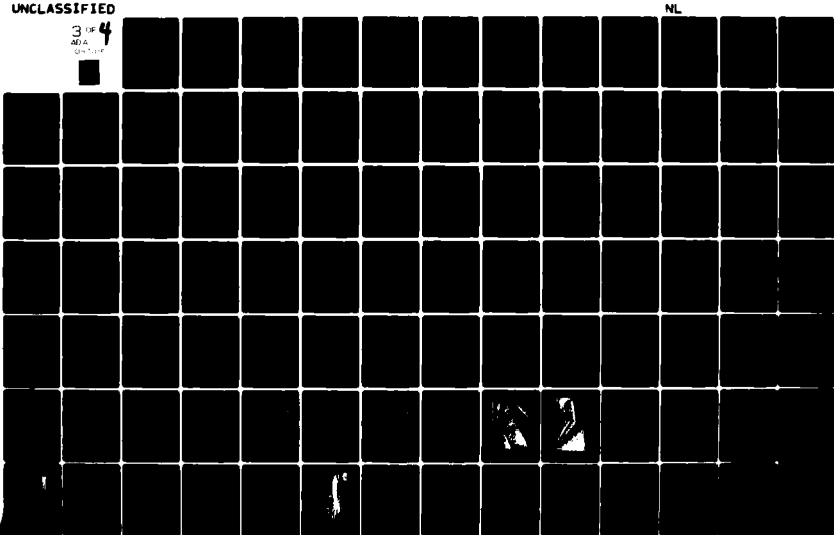

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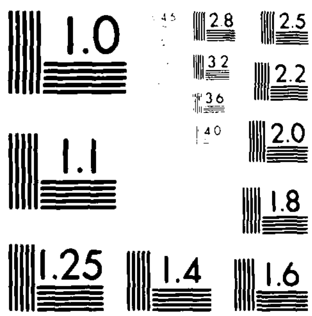

MICROCOPY RESOLUTION TEST CHART

INDUSTRY SERVICE AND SUPPLY

VESSEL TYPE TOWING AND SUPPLY BOAT CLASS 30.5-41 m (100-134 ft)

APPROXIMATE NO. IN SERVICE 64

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Offshore oil field supply and towing
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 30.5-41m (100-134 ft) Beam 7-10 m (24- 32 ft) Depth 3-3.5 m (10- 11 ft) Draft 2.4-3 m (8- 10 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 600-5000 BHP, No. 2 diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	9-12/10-14 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	15-45 days/3600-14,000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	3-5 crew, 5-10 berths total, 8-15 maximum with changes
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 9
8.	VESSEL MANEUVERABILITY	Bow thruster normal on tug/supply; twin screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	150-200 tonnes, 50-150 m^3 (1765-5295 ft^3) liquid
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	60-280 m^2 (648-3024 ft^2) limited below deck
13.	AVERAGE DECK STRENGTH	1200 kg/m^2 (245 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	No cargo gear fitted
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Radio, radar, fathometer
16.	YEAR BUILT, HULL MATERIAL	1956-1976,1968-1970 average;steel
17.	CLASSIFICATION SOCIETY STATUS	Approximately 50% classed
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None, salt water washdown only
19.	EXTERNAL FIREFIGHTING CAPABILITY	Yes, 20% have foam pumps
20.	TOW WINCH(yes/no), BOLLARD PULL	Yes, 15-25 tonnes
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	20% ice class
23.	MISCELLANEOUS FEATURES	Extra chain locker,stern roller,dry cargo capacity deck

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Yes. Requires piping mods and pump additions depending on commodity carried
25.	ADDITIONAL PASSENGER BERTHS	10-12
26.	CONTAINER CAPACITY (size, weight)	15-20 TEU,150-200 tonnes
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	May carry liquids in pressure tanks
29.	LARGEST PORTABLE CRANE MOUNTABLE	Hydraulic boom, 5-10 tonnes @ 10 m (33 ft) radius
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	None

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY OFFSHORE SERVICE AND SUPPLY

VESSEL TYPE TOWING AND SUPPLY BOAT CLASS 18-30 m (60-99 ft)

APPROXIMATE NO. IN SERVICE 30

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Offshore oil field supply and towing
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 18-30 m (60-99 ft) Beam 6-10 m (20-30 ft) Depth 1.5-5 m (5-15 ft) Draft 1.5-3 m (5-10 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 500-2000 BHP, No. 2 diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	8-12/10-14 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	10-15 days/2400-3600 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	2-5, 2-5 berths total, 12 max with changes
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 6
8.	VESSEL MANEUVERABILITY	Twin screw, occasional bow thruster
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	50-100 tonnes on deck only, 10-20 m^3 (353-706 ft^3)
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	58-104 m^2 (626-1123 ft^2) on deck only
13.	AVERAGE DECK STRENGTH	1200 kg/m^2 (245 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	No cargo gear fitted
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Radar, radio, fathometer
16.	YEAR BUILT, HULL MATERIAL	1957-1978, average 1968-1974; steel
17.	CLASSIFICATION SOCIETY STATUS	Majority unclassed
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None, salt water washdown only
19.	EXTERNAL FIREFIGHTING CAPABILITY	Average vessel has limited capability
20.	TOW WINCH (yes/no), BOLLARD PULL	Yes, 10-25 tonnes
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	None

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	30% yes. Average 50% additional capacity.
25.	ADDITIONAL PASSENGER BERTHS	8-10
26.	CONTAINER CAPACITY (size, weight)	10 TEU, 120 tonnes
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	None
29.	LARGEST PORTABLE CRANE MOUNTABLE	No
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	Less than half are fitted with special fire fighting equipment.

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY OIL EXPLORATION AND DRILLING

VESSEL TYPE DRILLSHIP CLASS 158-195 m (520-639 ft)

APPROXIMATE NO. IN SERVICE 17

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Ocean contracting for oil and gas drilling, production
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 158-195 m (520-639 ft) Beam 23-27 m (77-90 ft) Depth 9-18 m (30-60 ft) Draft 6-8 m (20-25 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel or Diesel/Electric 6000-16,000 BHP, No. 2 diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	9-12/10-15 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	50-100 days/8000-16,000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	20-40 crew, 80-136 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 10
8.	VESSEL MANEUVERABILITY	Excellent, all have bow and/or stern thrusters, 90% twin screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	5000-8000/2000-3000 tonnes 1000-2000/1000-3000 m^3 (35,300-70,600/35,300-105,900 ft^3)
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	1000-2000 m^2 (10,800-21,600 ft^2) on deck only
13.	AVERAGE DECK STRENGTH	2500 kg/m^2 (512 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	(2-4) revolving cranes 15-50 tonnes @ 10-36 m (33-119 ft) radius; (1) derrick 500-600 tonnes @ 49-52 m (162-172 ft) radius
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	LORAN; Radar; VHF, SSB radios; satellite navigation communication
16.	YEAR BUILT, HULL MATERIAL	1971-1978, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class Unlimited Ocean Service
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	500-700 gph Salt water washdown only
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	All fitted; 60% have refueling station
22.	ICE STRENGTHENING (yes/no)	90% ice class
23.	MISCELLANEOUS FEATURES	Drilling tower height above water 99-106 m (325-350 ft), passive roll positioning

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Existing tank for helicopter fuel; 1000-3000 gals ballast capacity, 3000-4000 m^3 (105,900-141,200 ft^3)
25.	ADDITIONAL PASSENGER BERTHS	20-40
26.	CONTAINER CAPACITY (size, weight)	100-250 TEU, 1000-3000 tonnes
27.	MAINTENANCE AND REPAIR FACILITIES	Machine shop, burning and welding, field tools
28.	SPECIAL CARGO CARRIAGE	Provisions for 15,000-20,000 m (50,000-65,000 ft) drill pipe and casing
29.	LARGEST PORTABLE CRANE MOUNTABLE	Fixed cranes mounted
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	Diesel engines fitted for draw works, 1000-2500 HP; mud pumps, 1000-2000 HP

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY OIL EXPLORATION AND DRILLING

VESSEL TYPE DRILLSHIP CLASS 110-148 m (362-485 ft)

APPROXIMATE NO. IN SERVICE 29

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	To explore offshore oil and gas fields. Drilling for oil worldwide
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 110-148 m (362-485 ft) Beam 21-25 m (64-82.5 ft) Depth 6.7-13 m (22-42.5 ft) Draft 5-7 m (17-23 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel or Diesel/Electric, 3000-9000 BHP, No. 2 diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	7-10/8-14 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	60-80 days/9000-13,000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	20-40 crew, 60-109 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 9
8.	VESSEL MANEUVERABILITY	40% have bow thrusters, 60% have twin screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	4000-5000/1000-2000 tonnes, 388-800/800-1200 m^3 (10,590-28,240/28,240-42,360 ft^3)
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	Minimal to none
13.	AVERAGE DECK STRENGTH	2000 kg/m^2 (410 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	(2) revolving cranes 35-80 tonnes @ 7-15 m (23-50 ft) radius; (1) derrick 400-600 tonnes @ 42-49 m (139-162 ft) radius
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Environmental motion monitoring system, satellite navigation data recording/communication
16.	YEAR BUILT, HULL MATERIAL	1951-1976, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class, Unlimited Ocean Service
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	300-600 gph, salt water washdown only
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	All have helipads
22.	ICE STRENGTHENING (yes/no)	50% ice class
23.	MISCELLANEOUS FEATURES	Drill tower height above water 45-83 m (150-250 ft), passive roll positioning

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Pressurized tanks for mud and bulk cement
25.	ADDITIONAL PASSENGER BERTHS	20-50
26.	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	Machine shop, welding and burning, few tools
28.	SPECIAL CARGO CARRIAGE	6000-7600 m (20,000-25,000 ft) drill pipe and casing
29.	LARGEST PORTABLE CRANE MOUNTABLE	Fixed cranes mounted
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	1600-2000 HP diesel engines fitted for draw works, drilling gear

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY OIL EXPLORATION AND DRILLING

VESSEL TYPE DRILLSHIP CLASS 52-98 m (170-320 ft)

APPROXIMATE NO. IN SERVICE 11

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Offshore probing for oil and natural gas. Drilling in deep water.
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 52-98 m (170-320 ft) Beam 7-32 m (24-105 ft) Depth 3-10 m (9-34 ft) Draft 2-5 m (8-17 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel 1000-3600 BHP, No. 2 diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	6-10/11-12 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	50 days/9000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	15-30 crew, 19-86 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 8
8.	VESSEL MANEUVERABILITY	2 have bow thrusters, 3 have twin screws
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	100-200 tonnes on deck, 100-800/500-1200 m^3 (3530-28,240/17,650-42,360 ft^3)
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	50-100 m^2 (540-1080 ft^2) on deck only
13.	AVERAGE DECK STRENGTH	2000 kg/m^2 (410 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	(2) revolving cranes 15-40 tonnes @ 10 m (33 ft) radius; (1) derrick 300-600 tonnes @ 42-48 m (139-158 ft) radius
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Gyro-compass, passive roll dynamic positioning, LORAN, VHF, SSB, satellite navigation.
16.	YEAR BUILT, HULL MATERIAL	1962-1976, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class, S-1 AMS; USCG certificated
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	300-600 gph salt water washdown only
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	All have helipads
22.	ICE STRENGTHENING (yes/no)	50% ice class
23.	MISCELLANEOUS FEATURES	Extensive tanks and pumps for bulk cement, barite and liquid mud, drill water

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	2000-4000 m^3 (70,600-141,200 ft^3) pressurized tanks convertible for liquid cargo
25.	ADDITIONAL PASSENGER BERTHS	20-50
26.	CONTAINER CAPACITY (size, weight)	Light container loading on heli-deck
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	Pipe sections, cement, construction material
29.	LARGEST PORTABLE CRANE MOUNTABLE	Fixed cranes mounted
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	Stores and replenishment vessels, mobile repair shops

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY OIL EXPLORATION AND DRILLING

VESSEL TYPE SEMI-SUBMERSIBLE CLASS SELF-PROPELLED

APPROXIMATE NO. IN SERVICE 33

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Mobile offshore oil and gas drilling. Offshore maintenance and construction
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length of hull 55-121 m (180-399 ft) Beam 46-80 m (150-262 ft) Height above platform above keel 30-45 m (100-150 ft) Draft (in transit) 6-9 m (20-30 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 6000-8000 BHP, No. 2 diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	6-9/8-10 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	50-100 days/9000-14,000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	50-66 crew, 77-100 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 10
8.	VESSEL MANEUVERABILITY	Excellent, 50% have bow thrusters, all have twin screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	2000-4500 tonnes on deck only, 250-620/140-300 m3 (8825-22,000/ 4942-10,590 ft^3)
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	600-900 m^2 on deck only
13.	AVERAGE DECK STRENGTH	800 kg/m^2 (160 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	(2) revolving cranes 30-80 tonnes @ 9-37 m (30-122 ft) radius; (1) derrick 550-700 tonnes @ 44-52 m (145-172 ft) radius
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	High seas navigation, dynamic positioning, VHF, motion monitoring system, satellite navigation communication
16.	YEAR BUILT, HULL MATERIAL	1971-1978, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class, Unlimited Service
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	500-600 gph, salt water washdown only
19.	EXTERNAL FIREFIGHTING CAPABILITY	Foam and water monitors
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	All have helipad
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	4-8 point mooring system w/(4-8)13-20 tonnes anchors

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Pressure tanks holding dry cement 300-500 m^3 (10,590-17,650 ft^3)
25.	ADDITIONAL PASSENGER BERTHS	100-150
26.	CONTAINER CAPACITY (size, weight)	200-300 TEU, 2400-3600 tonnes
27.	MAINTENANCE AND REPAIR FACILITIES	Extensive
28.	SPECIAL CARGO CARRIAGE	12,000-20,000 m (39,600-66,000 ft) drill pipe and casing
29.	LARGEST PORTABLE CRANE MOUNTABLE	Fixed cranes mounted
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	Diesel powered mud pumps 2000-4000 HP, Draw works 2000-3000 HP

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY OIL EXPLORATION AND DRILLING

VESSEL TYPE SEMI-SUBMERSIBLE CLASS NON-SELF-PROPELLED

APPROXIMATE NO. IN SERVICE 42

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Mobile offshore oil and gas drilling, offshore maintenance and construction
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length of hull 62-115 m (202-377 ft) Beam 55-67 m (182-221 ft) Height of platform above keel 34-42 m (110-138 ft) Draft (in transit) 5-6 m (18-21 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Non-propelled, tow required (3600-14,000 BHP)
4.	CRUISING/MAXIMUM SPEEDS	5-10 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	None
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	30-50 crew, 43-92 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 10
8.	VESSEL MANEUVERABILITY	Good;winches and/or bow thrusters are used as mooring line tensioners
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	2000-4500 tonnes on deck only, 260-410/93-152 m^3 (9200-14,000/3300-5400 ft^3)
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	600-900 m^2 (6480-9630 ft^2) on deck
13.	AVERAGE DECK STRENGTH	800 kg/m^2 (160 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	(2-3)revolving cranes 17-100 tonnes @ 6-30 m (20-99 ft) radius; (1) derrick 400-600 tonnes @ 45-49 m (148-162 ft) radius
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Stabilization tanks; VHF, SSB radios; satellite communication
16.	YEAR BUILT, HULL MATERIAL	1963-1978, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class, Unlimited Service
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	300-600 gph, salt water washdown only
19.	EXTERNAL FIREFIGHTING CAPABILITY	Foam and water monitors
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	All have helipad
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	4-10 anchors @ 10-20 tonnes for mooring, 7 cm (3 in) chain on each anchor

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Highly suitable. Fast discharge provided by air compressors for storage tanks
25.	ADDITIONAL PASSENGER BERTHS	100-150
26.	CONTAINER CAPACITY (size, weight)	200-300 TEU, 2400-3600 tonnes
27.	MAINTENANCE AND REPAIR FACILITIES	Extensive
28.	SPECIAL CARGO CARRIAGE	12,000-20,000 m (39,600-66,000 ft) of drill pipe and casing
29.	LARGEST PORTABLE CRANE MOUNTABLE	Fixed cranes mounted
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	Diesel powered mud pumps 2000-4000 HP; Draw works 2000-3000 HP

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY FISHING

VESSEL TYPE TUNA SEINER CLASS 1000-1600 GRT

APPROXIMATE NO. IN SERVICE 32

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Transoceanic tuna fishing from California, Puerto Rico, American Samoa, and Luzon
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 50-78 m (166-258 ft) Beam 12-13 m (40-43 ft) Depth 5-7 m (18-22 ft) Draft 5-7 m (18-22 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 3600-5600 BHP, diesel oil
4.	CRUISING/MAXIMUM SPEEDS	14-17 knots @ cruise
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	80-90 days/10,000-12,000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	15-16 crew, 12-20 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 8
8.	VESSEL MANEUVERABILITY	Bow thrusters and anti-roll stabilizers, twin screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	1000-1600 tonnes below deck, 1100-2000 m^3 (40,000-70,000 ft^3)
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Galley stores and fish holds
12.	CLEAR CARGO AREA (on deck/below deck)	92-140 m^2 (1000-1500 ft^2) on deck only
13.	AVERAGE DECK STRENGTH	Not suitable for loading
14.	CARGO/MATERIAL HANDLING CAPACITY	Hydraulic seine winch with 1800 m (6000 ft) of 1.9 cm (.75 in) wire
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Radar; depth finder; RDF; radio telephone; VHF, SSB, CB radios; auto pilot; satellite navigation
16.	YEAR BUILT, HULL MATERIAL	1967-1978, steel
17.	CLASSIFICATION SOCIETY STATUS	Built to ABS standards (unclassed)
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	10-15 gpm @ 60 psi, 1.5 HP
19.	EXTERNAL FIREFIGHTING CAPABILITY	400 gpm, CO_2 system
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	Yes, on 30% of vessels
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	Port and starboard booms, 2-3 tonnes @1-2 m (3-7 ft) outreach

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Possible conversion of fish holds for 300,000-500,000 gals
25.	ADDITIONAL PASSENGER BERTHS	None; 10, with conversion
26.	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	Complete for self-sufficient long range cruising
28.	SPECIAL CARGO CARRIAGE	Refrigerated
29.	LARGEST PORTABLE CRANE MOUNTABLE	None
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	(5) 75 HP, (4) 100 HP ammonia compressors

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY FISHING

VESSEL TYPE TUNA SEINER CLASS 300-999 GRT

APPROXIMATE NO. IN SERVICE 83

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Purse seining from California and Puerto Rico
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 35-60 m (114-196 ft) Beam 9-12 m (30-40 ft) Depth 4-6 m (15-18 ft) Draft 6-7 m (18-21 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 1100-2800 BHP, diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	13-14/15-16 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	50-60 days/8000-9000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	14-20 crew, 14-25 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 8
8.	VESSEL MANEUVERABILITY	Bow thrusters and anti-roll stabilizers are common on vessels over 45m (150 ft) LOA
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	500-950 tonnes, 600-1200 m^3 (21,000-42,000 ft^3)
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables and fish holds
12.	CLEAR CARGO AREA (on deck/below deck)	None
13.	AVERAGE DECK STRENGTH	Not suitable for loading
14.	CARGO/MATERIAL HANDLING CAPACITY	Hydraulic seine winch with 2000 m (6500 ft) of 1.5-2.0 cm (0.6-0.8 in) wire
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Radar; autopilot; depth finder; RDF; radio telephone; VHF, SSB, and CB radios; satellite navigation
16.	YEAR BUILT, HULL MATERIAL	1942-1975; (80) steel, (3) wood
17.	CLASSIFICATION SOCIETY STATUS	Built to ABS standards (unclassed)
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	Sea water distillers with 40-50 gals pressure tank
19.	EXTERNAL FIREFIGHTING CAPABILITY	5-10 HP sea water pumps
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	Yes, on about 30% of vessels
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	Net handling block capacity 5.0-6.6 tonnes

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Conversion of double bottom for extra tankage
25.	ADDITIONAL PASSENGER BERTHS	No
26.	CONTAINER CAPACITY (size, weight)	None ; 10, with conversion
27.	MAINTENANCE AND REPAIR FACILITIES	Machine shop and spare parts on board
28.	SPECIAL CARGO CARRIAGE	Refrigerated
29.	LARGEST PORTABLE CRANE MOUNTABLE	None
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	(12-16) cargo wells lined with ammonia coils, (4) 40-80 HP compressors

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY FISHING

VESSEL TYPE TUNA SEINER CLASS 200-299 GRT

APPROXIMATE NO. IN SERVICE 5

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Purse seining out of California, Oregon, Alaska and Puerto Rico
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 28-33 m (91-107 ft) Beam 8-10 m (25-30 ft) Depth 4-5 m (12-15 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 450-1000 BHP
4.	CRUISING/MAXIMUM SPEEDS	10-11/12-13 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	30-40 days/7000-9000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	7-10 crew, 9-15 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 7
8.	VESSEL MANEUVERABILITY	Good, bow thruster and single screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	100-300 tonnes below deck, 100-300 m^3 (3500-10,500 ft) fish hold volume
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables and fish holds
12.	CLEAR CARGO AREA (on deck/below deck)	75-120 m^2 (800-1250 ft^2) holds
13.	AVERAGE DECK STRENGTH	Not suitable for deck loading
14.	CARGO/MATERIAL HANDLING CAPACITY	Hydraulic seine winch, powered block for net handling with 1-3 tonnes capacity
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	RDF, radar; depth sounder; SSB, VHF; autopilot; some also have satellite navigation
16.	YEAR BUILT, HULL MATERIAL	1941-1975 (1) wood, (4) steel
17.	CLASSIFICATION SOCIETY STATUS	Unclassed
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	Sea water distillers
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	None

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	25,000-75,000 gals in fish holds
25.	ADDITIONAL PASSENGER BERTHS	None; 4-5 with conversion
26.	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	Work space with tools and machines
28.	SPECIAL CARGO CARRIAGE	Refrigerated
29.	LARGEST PORTABLE CRANE MOUNTABLE	None
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY FISHING

VESSEL TYPE TUNA CLASS BAITBOAT

APPROXIMATE NO. IN SERVICE 47

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Tuna fishing by the pole and line method
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 14-34 m (49-111 ft) Beam 3-7 m (11-22 ft) Depth 2-4 m (6-12 ft) Draft 1-4 m (2-12 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 125-600 BHP, Commercial diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	10-12/12-14 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	5-30 days/1200-8000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	2-10 crew, 4-15 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 6-7
8.	VESSEL MANEUVERABILITY	Good, 90% have single screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	8-270 tonnes below deck, 8-270 m^3 (280-9500 ft^3)
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	10-120 m^2 (100-1300 ft^2) on deck only
13.	AVERAGE DECK STRENGTH	Not suitable for loading
14.	CARGO/MATERIAL HANDLING CAPACITY	None
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Radar; RDF; LORAN; compass, VHF SSB, CB radios
16.	YEAR BUILT, HULL MATERIAL	1925-76, steel and wood
17.	CLASSIFICATION SOCIETY STATUS	Unclassed
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	None

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Conversion of fish holds for 2000-70,000 gals
25.	ADDITIONAL PASSENGER BERTHS	None
26.	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	Workbench and field tools
28.	SPECIAL CARGO CARRIAGE	None
29.	LARGEST PORTABLE CRANE MOUNTABLE	None
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY FISHING

VESSEL TYPE MENHADEN CLASS 24-61 m (80-200 ft)

APPROXIMATE NO. IN SERVICE 140

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Seasonal, inshore fishing with nets for Menhaden
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 24-61 m (80-200 ft) Beam 6-12 m (20-40 ft) Draft 3 meters or less (10 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 1000-2500 BHP
4.	CRUISING/MAXIMUM SPEEDS	9-12/13-15 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	1-7 days/100-3000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	5-20 crew, 10-30 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 6
8.	VESSEL MANEUVERABILITY	Normally twin screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	90-680 tonnes 400-800 m^3 (14,120-28,240 ft^3)
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	50-300 m^2 (540-3240 ft^2) on deck only
13.	AVERAGE DECK STRENGTH	Not suitable for deck loading
14.	CARGO/MATERIAL HANDLING CAPACITY	Booms available for handling nets
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Limited - radios, compass, some radar and LORAN ,particularly in New England
16.	YEAR BUILT, HULL MATERIAL	1968-1978, newbuilt or rebuilt WWII surplus
17.	CLASSIFICATION SOCIETY STATUS	Documented, but uninspected
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	Compressers fitted for refrigeration of fish holds

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Yes
25.	ADDITIONAL PASSENGER BERTHS	5-10
26.	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	None
29.	LARGEST PORTABLE CRANE MOUNTABLE	None
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY FISHINC

VESSEL TYPE KING CRAB CLASS 26-52 m (86-170 ft)

APPROXIMATE NO. IN SERVICE 190

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	King Crab trapping in Bering Sea, Kodiac, Alaska
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 26-52 m (86-170 ft) Beam 8-11 m (26-35 ft) Draft 4-5 m (12-15 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Twin Diesel, 700-1000 BHP
4.	CRUISING/MAXIMUM SPEEDS	10-12/12-14 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	20-30 days/4800-8600 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	6-7 crew, 9-10 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 8
8.	VESSEL MANEUVERABILITY	Good, twin screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	68-120 tonnes 170-280 m^3 (6000-10,000 ft^3)
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	140-300 m^2 (1500-3200 ft^2) on deck only
13.	AVERAGE DECK STRENGTH	Not suitable for loading
14.	CARGO/MATERIAL HANDLING CAPACITY	Trawl winches, hydraulic crane 8-11 tonnes @ 3-15 m (10-50 ft) radius
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Radar; depth indicator; autopilot; LORAN; SSB, VHF radios
16.	YEAR BUILT, HULL MATERIAL	1968-1978, steel
17.	CLASSIFICATION SOCIETY STATUS	USCG registry, uninspected
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	Sea water circulating system for holds, 20-HP diesel-driven
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	Stern ramps, booms for side handling of pots and nets

B. VESSEL ADAPTABILITY

24	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	45,000-74,000 gals in crab holds
25.	ADDITIONAL PASSENGER BERTHS	3-4
26.	CONTAINER CAPACITY (size, weight)	No
27.	MAINTENANCE AND REPAIR FACILITIES	Minor machinery repair, spare parts carried
28.	SPECIAL CARGO CARRIAGE	Refrigerated
29.	LARGEST PORTABLE CRANE MOUNTABLE	Hydraulic crane 8-11 tonnes @ 3-15 m (10-49 ft) radius
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY FISHING

VESSEL TYPE KING CRAB CLASS 18-26 m (58-85 ft)

APPROXIMATE NO. IN SERVICE 260

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	King Crab trapping off coastal Alaska
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 18-26 m (58-85 ft) Beam 5-8 m (18-25 ft) Draft 2-4 m (7-12 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 250-450 BHP, commercial fuel
4.	CRUISING/MAXIMUM SPEEDS	9-10/12-13 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	15-25 days/3000-6000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	4-5 crew, 7-8 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 6
8.	VESSEL MANEUVERABILITY	Good, small boat with single screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	85-150 m^3 (3000-5000 ft^3) refrigerated hold
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	90-140 m^2 (1000-1500 ft^2)
13.	AVERAGE DECK STRENGTH	Not suitable for loading
14.	CARGO/MATERIAL HANDLING CAPACITY	Trawl winches with 1800 m (6000 ft) of 1.6 cm (.6 in) wire
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Fathometer; water temperature gage; radar; LORAN; compass; SSB, VHF, SW, CB radios.
16.	YEAR BUILT, HULL MATERIAL	1950-1978, wood
17.	CLASSIFICATION SOCIETY STATUS	USCG registry, uninspected
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	Low-HP motors drive sea water pumps
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	Stern ramps, net handling block capacity 2.7-3.0 tonnes

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	22,000-44,000 gals in crab holds
25.	ADDITIONAL PASSENGER BERTHS	2-4
26.	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	Minor repair capability
28.	SPECIAL CARGO CARRIAGE	Refrigerated
29.	LARGEST PORTABLE CRANE MOUNTABLE	None
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY FISHING

VESSEL TYPE TRAWLER/GROUNDFISHING CLASS 40 + m (130 + ft)

APPROXIMATE NO. IN SERVICE 20

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Extended ocean and Grand Banks fish trawling and processing
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 40 + m (130 + ft) Beam 8-14 m (25-45 ft) Depth 5-10 m (17-30 ft) Draft 4-5 m (13-16 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel or Diesel/Electric, 500-3000 BHP
4.	CRUISING/MAXIMUM SPEEDS	9-10/12-14 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	30-60 days/4000-10,000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	30-80, same total berths
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 9
8.	VESSEL MANEUVERABILITY	Bow thruster, normally single screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	100-300 tonnes below deck, 170-425 m^3 (6000-15,000 ft^3)
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	Deck space for net handling 100-300 m^2 (1080-3240 ft^2)
13.	AVERAGE DECK STRENGTH	Not suitable for deck loading
14.	CARGO/MATERIAL HANDLING CAPACITY	200-400 HP diesel powered winch with 1000-1500 m (3300-4950 ft) of 2-3 cm (0.8-1.2 in) wire; hydraulic boom capacity 5-15 tonnes
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	High seas navigation, fish finders; VHF, SSB radios
16.	YEAR BUILT, HULL MATERIAL	1936-1979, steel
17.	CLASSIFICATION SOCIETY STATUS	10% ABS class
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	50% have distillers
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	Fish chute from trawl deck to compartment under deck, ice making

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Ballast and potable water tanks could be used for fuel
25.	ADDITIONAL PASSENGER BERTHS	5-30
26.	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	Field tools, minor capability
28.	SPECIAL CARGO CARRIAGE	Refrigerated
29.	LARGEST PORTABLE CRANE MOUNTABLE	None
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY FISHING

VESSEL TYPE TRAWLER/GROUNDFISHING CLASS 23-39 m (76-129 ft)

APPROXIMATE NO. IN SERVICE 200

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	New Wngland inshore and offshore groundfish trawling and dragging
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 24-39 m (79-128 ft) Beam 6-9 m (23-30 ft) Depth 3-4 m (12-14 ft) Draft 3-4 m (12-14 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 500-1400 BHP, commercial diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	10-12/11-15 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	10-14 days, 20 days for larger vessels
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	7-15 crew, 8-20 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 8
8.	VESSEL MANEUVERABILITY	Good maneuverability, usually single screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	40-250 tonnes, 100-250 m^3 (3500-9000 ft^3) on deck, refrigerated hold
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	100-200 m^2 (1080-2160 ft^2) on deck only
13.	AVERAGE DECK STRENGTH	Support small crane and winches only
14.	CARGO/MATERIAL HANDLING CAPACITY	Hydraulic crane, 10 tonnes @ 5-10 m (16.5-33 ft) radius; 100-140 HP winch with 800-1600 m (2640-5280 ft) of 2.5 cm (1 in) wire
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Radar, LORAN, fathometer, fish finder, sonar; SSB, VHF, CB radios
16.	YEAR BUILT, HULL MATERIAL	1950-1978; 50% wood, 50% steel
17.	CLASSIFICATION SOCIETY STATUS	Documented but uninspected
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	Stern ramps

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Insulated, refrigerated tanks/holds throughout
25.	ADDITIONAL PASSENGER BERTHS	5-10
26.	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	Minimal
28.	SPECIAL CARGO CARRIAGE	Fish, lobster
29.	LARGEST PORTABLE CRANE MOUNTABLE	None
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY FISHING

VESSEL TYPE TRAWLER/GROUNDFISHING CLASS 17-23 m (55-75 ft)

APPROXIMATE NO. IN SERVICE 400

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	New England inshore and offshore groundfish trawling and dragging
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 17-23 m (55-75 ft) Beam 5-7 m (17-22 ft) Draft 2-3 m (7-11 ft) Depth 2-4 m (7-12 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 250-550 BHP, diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	9-10/11-13 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	10 days
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	2-9 crew, 5-12 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 8
8.	VESSEL MANEUVERABILITY	Good maneuverability
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	20-40 tonnes, 28-127 m^3 (988-4483 ft^3)
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	50-70 m^2 (540-756 ft^2) on deck only
13.	AVERAGE DECK STRENGTH	Not suitable for deck loading
14.	CARGO/MATERIAL HANDLING CAPACITY	60-80 HP winches with 300-600 m (990-1980 ft) of 1.6-1.9 cm (0.6-0.8 in) wire
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	SSB,VHF,CB radios; LORAN A/C,fathometer, fish finder, radar, sonar, autopilot
16.	YEAR BUILT, HULL MATERIAL	Many 1936 vintage and wood construction
17.	CLASSIFICATION SOCIETY STATUS	Documented, but uninspected
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH(yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	Stern ramp

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Minimal to none
25.	ADDITIONAL PASSENGER BERTHS	2-4
26.	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	Minimal
28.	SPECIAL CARGO CARRIAGE	Fish
29.	LARGEST PORTABLE CRANE MOUNTABLE	None
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY FISHING

VESSEL TYPE TRAWLER CLASS SCALLOPER

APPROXIMATE NO IN SERVICE 60

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Scallop harvesting
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 27-33 m (90-107 ft) Beam 8-8.5 m (25-26 ft) Depth 4-4.5 m (14-15.5 ft) Draft 3-4 m (10-13 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 750-1000 BHP, No. 2 diestl fuel
4.	CRUISING/MAXIMUM SPEEDS	8-10/11-12 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	7-10 days/1000-2000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	5-10 crew, 10-15 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 6
8.	VESSEL MANEUVERABILITY	Usually neither bow thruster nor twin screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	100-200 m^3 (3530-7060 ft^3) hold capacity
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	Limited deck capacity due to deck winches
13.	AVERAGE DECK STRENGTH	Not suitable for deck loading
14.	CARGO/MATERIAL HANDLING CAPACITY	Newer vessels have heavy lift gear for 2-10 tonnes, trawl winch with 750-1000 m (2475-3300 ft) of 2-3 cm (0.8-1.2 in) wire
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	SSB, VHF, CB radios, LORAN A/C fathometer, radar, sonar, autopilot
16.	YEAR BUILT, HULL MATERIAL	1950-1978, steel
17.	CLASSIFICATION SOCIETY STATUS	USCG registered
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	10% have stern ramps

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Ballast tanks and potable water tanks could be used for fuel
25.	ADDITIONAL PASSENGER BERTHS	2-5
26	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	Minimal
28.	SPECIAL CARGO CARRIAGE	Refrigerated
29.	LARGEST PORTABLE CRANE MOUNTABLE	None
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY FISHING

VESSEL TYPE SHRIMP CLASS 25-29 m (82-95 ft)

APPROXIMATE NO. IN SERVICE 250

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Long-range shrimp fishing
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 25-29 m (82-95 ft) Beam 7-8 m (23-26 Depth 3-4 m (10-13 ft) Draft 2.5-3.5 m (8-11 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 400-750 BHP, No. 2 diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	9-11/12-13 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	[illegible]-90 days/[illegible] miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	5-9 crew
7	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 8
8.	VESSEL MANEUVERABILITY	Usually single screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	370-500 m³ (4000-5300 ft³) refrigerated hold capacity
10.	DRY STORES CAPACITY	Crew consumables only
11	REEFER CAPACITY	370-500 m³ (4000-5300 ft³)
12.	CLEAR CARGO AREA (on deck/below deck)	[illegible]
13.	AVERAGE DECK STRENGTH	Not suitable for deck loading
14	CARGO/MATERIAL HANDLING CAPACITY	6-tonne capacity boom; trawl winch capacity 6 tonnes on 2 drums
15	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Compass; autopilot; VHF, SSB radios; fathometer; radar
16.	YEAR BUILT, HULL MATERIAL	1960-19[illegible]; wood, steel [illegible] recently
17	CLASSIFICATION SOCIETY STATUS	USCG registered
18	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21	HELIPAD (yes/no)	No
22	ICE STRENGTHENING (yes/no)	No
23	MISCELLANEOUS FEATURES	None

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	18,000-32,000 gals fuel
25.	ADDITIONAL PASSENGER BERTHS	None
26.	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	None
29	LARGEST PORTABLE CRANE MOUNTABLE	None
30	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY FISHING

VESSEL TYPE SHRIMP CLASS 22-25 m (72-81 ft)

APPROXIMATE NO. IN SERVICE 1500

CANDIDATE VESSEL CHARACTERISTICS

A GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Shrimp fishing
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 22-25 m (72-81 ft) Beam 6-7 m (20-23 ft) Depth 3-4 m (11-13 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 400-500 BHP, No. 2 diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	9-10/11-13 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	30-60 days/7000-14,000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	3-6 crew
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 7
8.	VESSEL MANEUVERABILITY	Usually single screw; small and maneuverable
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	8-16 m^3 (282-565 ft^3) hold capacity
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	50% of vessels have refrigeration system
12.	CLEAR CARGO AREA (on deck/below deck)	30-40 m^2 (322-430 ft^2) on deck
13.	AVERAGE DECK STRENGTH	Not suitable for deck loading
14.	CARGO/MATERIAL HANDLING CAPACITY	5-tonne capacity boom; trawl winch capacity 20 tonnes on 2 drums
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Autopilot
16.	YEAR BUILT, HULL MATERIAL	1950-1978, steel, wood, fiberglass
17.	CLASSIFICATION SOCIETY STATUS	USCG registered
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	None

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	14,000-22,000 gals additional fuel
25.	ADDITIONAL PASSENGER BERTHS	None
26.	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	None
29.	LARGEST PORTABLE CRANE MOUNTABLE	None
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY FISHING

VESSEL TYPE SHRIMP CLASS 20-22 m (65-71 ft)

APPROXIMATE NO. IN SERVICE 2450

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Shrimp fishing
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall [illegible] m (65-71 ft) Beam 5-7 m (16-23 ft) Depth [illegible]-3 m (8-11 ft) Draft 2-2.5 m (8-10 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 300-400 BHP, No. 2 Diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	9-10/11-12 Knots
5	ENDURANCE (days/miles) AT ABOVE SPEEDS	10-[illegible] days
6	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	3-[illegible] crew, 6-8 berths total
7	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	[illegible]
8	VESSEL MANEUVERABILITY	Single screw, small and maneuverable
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	[illegible] m³ ([illegible]-30 ft³)
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	[illegible]
13	AVERAGE DECK STRENGTH	Not suitable for deck loading
14.	CARGO/MATERIAL HANDLING CAPACITY	[illegible]-tonne capacity boom; trawl winch capacity [illegible] tonnes on 2-[illegible] drums
15	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Autopilot; VHF, SSB radios; compass; fathometer
16.	YEAR BUILT, HULL MATERIAL	[illegible], steel or fiberglass
17.	CLASSIFICATION SOCIETY STATUS	USCG registered
18	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	No
23	MISCELLANEOUS FEATURES	None

B VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	10,000-16,000 gals additional fuel
25.	ADDITIONAL PASSENGER BERTHS	No
26.	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	No
29.	LARGEST PORTABLE CRANE MOUNTABLE	None
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY OCEAN RESEARCH

VESSEL TYPE RESEARCH SHIP CLASS 85-92 m (278-303 ft)

APPROXIMATE NO. IN SERVICE 4

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Deep ocean surveys, hydrographic surveys, oceanographic surveys and fisheries research
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 85-92 m (278-303 ft) Beam 14-16 m (46-52 ft) Depth 4-6 m (15-21 ft) Draft 5-6 m (16-20 ft) Height 27-34 m (91-114 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	2 Diesel/Electric, 1 Diesel, 1 Steam turbine; 2500-5000 SHP, 170-312 gph @ cruising
4.	CRUISING/MAXIMUM SPEEDS	11-15/18 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	27-40 days/8400-15,200 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	67-90 crew, 84-129 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 7
8.	VESSEL MANEUVERABILITY	Good; all have bow thrusters, 400-450 BHP; 3 have twin screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	300-500/350-500 tonnes, 200-3000/1000-1300 m^3 (70,600-105,900/35,300-45,890 ft^3)
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	500-1000/250-500 m^2
13.	AVERAGE DECK STRENGTH	1500 kg/m^2 (300 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	(1-2)cranes, 2-5 tonnes @ 10-12m (33-40ft) radius, (2-4) winches, 30-140 HP with 9100-13,700 m (30,000-45,200 ft) of 0.5-1.9 cm (0.2-0.7 in) wire
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	RDF; satellite navigation/communication; radar; E/M Log; SSB, VHF radios; teletype
16.	YEAR BUILT, HULL MATERIAL	1954-1964, steel
17.	CLASSIFICATION SOCIETY STATUS	Public vessels
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	700-8000 gals/day, salt water washdown only
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	1 has platform, 1 has portable helipad
22.	ICE STRENGTHENING (yes/no)	3 bows only, 1 hull
23.	MISCELLANEOUS FEATURES	Stern A-frame crane, 5 tonnes @ 10 m (33 ft) outreach

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	No significant capacity
25.	ADDITIONAL PASSENGER BERTHS	17-30 w/o conversion
26	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	Nansen bottles, rock dredging
29.	LARGEST PORTABLE CRANE MOUNTABLE	Hydraulic boom, 5-10 tonnes @ 10-20 m (33-66 ft) radius
30.	UNDERWAY REPLENISHMENT (yes/no)	No
31.	OTHER POSSIBLE FEATURES	Lab area, oceanographic wet and dry: 8-316 m^2 (26-104? ft^2), photographic: 7-16 m^2 (23-53 ft^2) geological: 15-17 m^2 (50-56 ft^2), data processing: ?7-50 m^2 (50-56 ft^2)

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY OCEAN RESEARCH

VESSEL TYPE RESEARCH SHIP CLASS 63-75 m (208-245 ft)

APPROXIMATE NO. IN SERVICE 12

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Hydrographic and oceanographic surveys, fisheries research
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 63-75 m (208-245 ft) Beam 10-15 m (30-50 ft) Depth 3-5 m (10-18 ft) Draft 3-5 m (10-18 ft) Height 20-30 m (65-98 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 1020-2800 BHP, No. 2 diesel fuel, 54-125 gph @ cruising
4.	CRUISING/MAXIMUM SPEEDS	7-14/8-16 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	30-60 days/6000-16,000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	20-30 crew, 36-50 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 6
8.	VESSEL MANEUVERABILITY	Good, 10 have bow thrusters, 50% twin screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	40-50/20-40 tonnes. 500-1000/500-600 m^3 (17,650-35,300/17,650-21,180 ft^3)
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	150-200/150-200 m^2 (1620-2160/1620-2160 ft^2)
13.	AVERAGE DECK STRENGTH	1500 kg/m^2 (300 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Hydraulic cranes: 5 tonnes @ 13 m (43 ft) radius, diesel-powered winch with 10,000-15,000 m (33,000-49,500 ft) of 1.4 cm (0.5 in) wire
15	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Fathometer; satellite navigation; SSB, VHF, AM radios; LORAN; RDF; radar; speed logs
16.	YEAR BUILT, HULL MATERIAL	1962-1970, steel (1 aluminum)
17.	CLASSIFICATION SOCIETY STATUS	Public, undocumented vessels
18	FRESH WATER MAKING AND WASHDOWN CAPABILITY	1500-6000 gals/day, salt water washdown only
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	3 vessels are ice class
23.	MISCELLANEOUS FEATURES	Stern A-frame, (2-6) boat davits @ 2-3 tonnes capacity, scuba gear

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Not suited to carry substantial liquid cargo
25.	ADDITIONAL PASSENGER BERTHS	17-31
26.	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	Launches of 4-10 m (13-33 ft) LOA
29.	LARGEST PORTABLE CRANE MOUNTABLE	Hydraulic boom, 5-10 tonnes @ 4-15 m (13-50 ft) radius
30.	UNDERWAY REPLENISHMENT (yes/no)	No
31.	OTHER POSSIBLE FEATURES	Lab area: 20-30 (216-324 ft^2) Data processing: 30-40 (324-432 ft^2) horizontal echo sounding system

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY OCEAN RESEARCH

VESSEL TYPE RESEARCH SHIP CLASS 47-57 m (156-187 ft)

APPROXIMATE NO. IN SERVICE 19

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Hydrographic and oceanographic survey, fisheries research
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 47-57 m (156-187 ft) Beam 9-11 m (30-38 ft) Depth 3-6 m (9-18 ft) Draft 3-6 m (9-18 ft) Height 15-25 m (50-82 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 800-2800 BHP, No. 2 diesel fuel, 50-120 gph @ cruising
4.	CRUISING/MAXIMUM SPEEDS	10-13/12-15 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	15-60 days/4500-10,700 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	15-20 crew, 25-40 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 6
8.	VESSEL MANEUVERABILITY	Good, bow thruster and twin screw common
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	70-500/100-200 tonnes, 100-150/100-150 m^3 (3530-5295/3530-5295 ft^3)
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	100-150/50-100 m^2 (1080-1620/540-1080 ft^2)
13.	AVERAGE DECK STRENGTH	1464 kg/m^2 (300 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Hydraulic crane: 1-5 tonnes @ 14 m (46 ft) radius, diesel-powered winch 40-150 HP with 10,000-20,000 m (33,000-66,000 ft) of 1 cm (0.4 in) wire
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	RDF; radar; fathometer; Loran A/C; E/M Log; VHF, SSB radios; satellite navigation
16.	YEAR BUILT, HULL MATERIAL	1944-1975, steel
17.	CLASSIFICATION SOCIETY STATUS	Undocumented research vessel
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	200-2500 gals/day, salt water washdown only
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	5 vessels are ice class
23.	MISCELLANEOUS FEATURES	Some fishing gear, scuba gear, A-frame crane

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	No significant tankage, Ballast conversion 200-400 m^3 (7060-14,200 ft^3)
25.	ADDITIONAL PASSENGER BERTHS	7-17
26.	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	(1-6) launches of 3-8 m (10-26 ft) LOA
29.	LARGEST PORTABLE CRANE MOUNTABLE	Hydraulic, 1-6 tonnes @ 4-15 m (13-50 ft) radius
30.	UNDERWAY REPLENISHMENT (yes/no)	No
31.	OTHER POSSIBLE FEATURES	Deep water depth recorder, tide gauge, current meters, data processing lab area 20-85 m^2 (216-918 ft^2)

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY OCEAN RESEARCH

VESSEL TYPE RESEARCH BOAT CLASS [illegible] m (100-[illegible] ft)

APPROXIMATE NO. IN SERVICE [illegible]

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Oceanographic survey and research
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 30-45 m (100-149 ft) Beam 7-10 m (24-34 ft) Depth 2-5 m (7-16 ft) Draft 2-5 m (7-16 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 600-2500 BHP, No. 2 diesel fuel, 25-150 gph cruising
4.	CRUISING / MAXIMUM SPEEDS	[illegible] knot
5.	ENDURANCE (days / miles) AT ABOVE SPEEDS	[illegible] miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	13-17 crew, 17-30 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	[illegible]
8.	VESSEL MANEUVERABILITY	[illegible] vessels [illegible]
9.	CARGO DEADWEIGHT (on deck / below deck), NET CUBIC CAPACITY (dry / liquid)	[illegible]
10.	DRY STORES CAPACITY	Crew [illegible]
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck / below deck)	[illegible]
13.	AVERAGE DECK STRENGTH	[illegible]
14.	CARGO / MATERIAL HANDLING CAPACITY	Hydraulic cranes [illegible] radius; [illegible]
15.	NAVIGATION / COMMUNICATION EQUIPMENT INSTALLED	Radar; [illegible]
16.	YEAR BUILT, HULL MATERIAL	[illegible]
17.	CLASSIFICATION SOCIETY STATUS	[illegible] public vessels, [illegible]
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	[illegible]
19	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	1 vessel
23	MISCELLANEOUS FEATURES	3 wooden hulls 1 aluminum catamaran

B VESSEL ADAPTABILITY

24	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	No extra capacity
25.	ADDITIONAL PASSENGER BERTHS	5-15
26	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	None
28	SPECIAL CARGO CARRIAGE	5-18 m (16-59 ft) speed launch with scuba gear
29	LARGEST PORTABLE CRANE MOUNTABLE	None
30	UNDERWAY REPLENISHMENT (yes/no)	No
31	OTHER POSSIBLE FEATURES	Shoal water depth recorder, Tidal Current System - TICUS, General purpose digital computer

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY OCEAN RESEARCH

VESSEL TYPE RESEARCH BOAT CLASS 20-30 m (65-99 ft)

APPROXIMATE NO. IN SERVICE 35

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Oceanographic research and survey
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 20-30 m (65-99 ft) Beam 4-8 m (14-26 ft) Depth [illegible] m ([illegible]-12 ft) Draft 1-3 m (3-10 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, 140-1000 BHP, No. 2 diesel fuel, 10-40 gph @ cruising
4.	CRUISING/MAXIMUM SPEEDS	7-12 knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	2-20 days/300-5000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	5-15 crew, 10-40 berths total
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 5
8.	VESSEL MANEUVERABILITY	None have bow thrusters, 80% twin screw
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	No significant above or below deck capacity
10.	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	None
13.	AVERAGE DECK STRENGTH	732 kg/m^2 (150 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Cargo cranes: 0.3-2.3 tonnes @ 6.7 m (22 ft) outreach
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	RDF; Loran A/C; radar; satellite navigation; VHF, SSB radios
16.	YEAR BUILT, HULL MATERIAL	1943-1974, steel
17.	CLASSIFICATION SOCIETY STATUS	7 public vessels, most undocumented
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None, salt water washdown only
19.	EXTERNAL FIREFIGHTING CAPABILITY	Yes, fire stations on deck
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	2 vessels are ice class
23.	MISCELLANEOUS FEATURES	Laboratory area: 5-25 m^2 (54-270 ft^2)

B VESSEL ADAPTABILITY

24	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	[illegible]
25	ADDITIONAL PASSENGER BERTHS	[illegible]
26	CONTAINER CAPACITY (size, weight)	[illegible]
27	MAINTENANCE AND REPAIR FACILITIES	[illegible]
28	SPECIAL CARGO CARRIAGE	[illegible]
29	LARGEST PORTABLE CRANE MOUNTABLE	[illegible]
30	UNDERWAY REPLENISHMENT (yes/no)	[illegible]
31	OTHER POSSIBLE FEATURES	[illegible]

C BARGE CHARACTERISTICS ONLY

32	CONFIGURATION OF BOW	
33	COMPARTMENTATION BELOW DECK	
34	TYPE OF SKEGS	
35	MISCELLANEOUS FEATURES	

D DERRICK / CRANE BARGE CHARACTERISTICS ONLY

36	CAPACITY IN EACH MODE	

E DREDGE CHARACTERISTICS ONLY

37	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY DREDGING

VESSEL TYPE DREDGE BARGE CLASS CUTTER/SUCTION

APPROXIMATE NO. IN SERVICE 298

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	To maintain channels, create basins, recover building materials
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Significant measurement is in suction head. Little correlation with size of barge; length, 46-76 m (150-250 ft).
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Non-propelled, towing required; auxiliary diesel power for equipment
4.	CRUISING/MAXIMUM SPEEDS	None
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	None
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	Riding crew: 2, Dredge crew: 5-20 for 24 hours
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 4
8.	VESSEL MANEUVERABILITY	None
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	None
10.	DRY STORES CAPACITY	0-60 days consumables
11.	REEFER CAPACITY	0-60 days consumables
12.	CLEAR CARGO AREA (on deck/below deck)	None
13.	AVERAGE DECK STRENGTH	2500 kg/m^2 (512 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	Heavy duty gantries to handle ladder and spuds; 3-5 tonne ships service boom
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	VHF, SSB radios
16.	YEAR BUILT, HULL MATERIAL	1950-1978, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class, A-1 Barge
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	None

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	No
25.	ADDITIONAL PASSENGER BERTHS	May be added
26.	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	Machine shop
28.	SPECIAL CARGO CARRIAGE	None
29.	LARGEST PORTABLE CRANE MOUNTABLE	None
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	25-75 cm (10-30 in) diameter of suction head. 61-68 cm (24-27 in) range occurs most frequently.

INDUSTRY DREDGING

VESSEL TYPE DREDGE BARGE CLASS SUCTION

APPROXIMATE NO. IN SERVICE 74

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Dredging waterways, recovery of building materials
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Average dimensions: Length 47 m (155 ft) Beam 15 m (50 ft) Depth 3 m (10 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Non-propelled, towing required; diesel and some steam auxiliary power
4.	CRUISING/MAXIMUM SPEEDS	None
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	None
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	Riding crew for tow, 2-5; dredge operating crew, 4-7 (3 shifts).
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 2
8.	VESSEL MANEUVERABILITY	None
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	None
10.	DRY STORES CAPACITY	None
11.	REEFER CAPACITY	None
12.	CLEAR CARGO AREA (on deck/below deck)	None
13.	AVERAGE DECK STRENGTH	2500 kg/m^2 (512 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	None
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	VHF, SSB radios
16.	YEAR BUILT, HULL MATERIAL	1950-1978, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class, Barge
18	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH(yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	None

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Yes
25.	ADDITIONAL PASSENGER BERTHS	None
26.	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	Machine shop, burning and welding equipment
28.	SPECIAL CARGO CARRIAGE	None
29.	LARGEST PORTABLE CRANE MOUNTABLE	None
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	20-36 cm (8-14 in) suction head. Some units in those sizes lend themselves to easy portability for use in isolated areas.

INDUSTRY DREDGING

VESSEL TYPE DREDGE BARGE CLASS CLAMSHELL/BUCKET

APPROXIMATE NO. IN SERVICE 130

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Dredging waterways, docks, channels and whatever precise work is required
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 30-60 m (100-200 ft) Beam 10-21 m (35-70 ft) Depth 1.5-6 m (5-20 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Non-propelled, towing required Auxiliary diesel power for equipment
4.	CRUISING/MAXIMUM SPEEDS	None
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	None
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	5-10 crew, no accommodations
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 4
8.	VESSEL MANEUVERABILITY	None
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	None
10.	DRY STORES CAPACITY	None
11.	REEFER CAPACITY	None
12.	CLEAR CARGO AREA (on deck/below deck)	None
13.	AVERAGE DECK STRENGTH	2500 kg/m^2 (512 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	None
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	None
16.	YEAR BUILT, HULL MATERIAL	1940-1978, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class, Barge
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	None

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	Yes
25.	ADDITIONAL PASSENGER BERTHS	None
26.	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	Machine shop, burning and welding equipment
28.	SPECIAL CARGO CARRIAGE	None
29.	LARGEST PORTABLE CRANE MOUNTABLE	None
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	Capacity of clamshell and dragline buckets 1.1-12 m^3 (39-424 ft^3), depending on barge size

INDUSTRY MAINTENANCE SUPPORT

VESSEL TYPE FLOATING DRYDOCK CLASS 252-320 m (826-1050 ft)

APPROXIMATE NO. IN SERVICE 7

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Performance of maintenance and repair of vessels
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length 252-320 m (826-1050 ft) Beam 43-63 m (140-206 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Non-propelled
4.	CRUISING/MAXIMUM SPEEDS	None
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	None
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	Riding crew for towing and ship repair, no accommodations
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 4
8.	VESSEL MANEUVERABILITY	None
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	Lifting capacity: 36,000-81,000 tonnes
10.	DRY STORES CAPACITY	None
11.	REEFER CAPACITY	None
12.	CLEAR CARGO AREA (on deck/below deck)	None
13.	AVERAGE DECK STRENGTH	Not applicable
14.	CARGO/MATERIAL HANDLING CAPACITY	None
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	None
16.	YEAR BUILT, HULL MATERIAL	1960-1978, steel
17.	CLASSIFICATION SOCIETY STATUS	Lloyds registry
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No, but can be added
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	None

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	No
25.	ADDITIONAL PASSENGER BERTHS	None
26.	CONTAINER CAPACITY (size, weight)	3000-6750 TEU, 36,000-81,000 tonnes
27.	MAINTENANCE AND REPAIR FACILITIES	With ancillary units - complete
28.	SPECIAL CARGO CARRIAGE	None
29.	LARGEST PORTABLE CRANE MOUNTABLE	Revolving, 500 tonnes @ 25 m (82 ft) radius
30.	UNDERWAY REPLENISHMENT (yes/no)	No
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY MAINTENANCE SUPPORT

VESSEL TYPE FLOATING DRYDOCK CLASS 187-230 m. (614-755 ft)

APPROXIMATE NO. IN SERVICE 17

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Performance of maintenance and repair of vessels
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length 187-230 m (614-755 ft) Beam 27-35 m (87-14 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Non-propelled
4.	CRUISING/MAXIMUM SPEEDS	None
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	None
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	Riding crew for towing and ship repair, no accommodations
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 3
8.	VESSEL MANEUVERABILITY	None
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	Lifting capacity: 15,000-33,000 tonnes
10.	DRY STORES CAPACITY	None
11.	REEFER CAPACITY	None
12.	CLEAR CARGO AREA (on deck/below deck)	None
13.	AVERAGE DECK STRENGTH	Not applicable
14.	CARGO/MATERIAL HANDLING CAPACITY	None
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	None
16.	YEAR BUILT, HULL MATERIAL	1960-1978, steel
17.	CLASSIFICATION SOCIETY STATUS	60% Lloyds registry
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No, but can be added
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	None

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	No
25.	ADDITIONAL PASSENGER BERTHS	None
26.	CONTAINER CAPACITY (size, weight)	1250-2750 TEU, 15,000-33,000 tonnes
27.	MAINTENANCE AND REPAIR FACILITIES	With ancillary units - complete
28.	SPECIAL CARGO CARRIAGE	None
29.	LARGEST PORTABLE CRANE MOUNTABLE	Revolving, 300 tonnes @ 20 m (66 ft) radius
30.	UNDERWAY REPLENISHMENT (yes/no)	No
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY MAINTENANCE SUPPORT

VESSEL TYPE FLOATING DRYDOCK CLASS 126-182 m (412-598 ft)

APPROXIMATE NO. IN SERVICE 18

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Performance of maintenance and repair of vessels
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length 126-182 m (412-598 ft) Beam 20-52 m (67-171 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Non-propelled
4.	CRUISING/MAXIMUM SPEEDS	None
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	None
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	Riding crew for towing and ship repair, no accommodations
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 3
8.	VESSEL MANEUVERABILITY	None
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	Lifting capacity: 5700-18,000 tonnes
10.	DRY STORES CAPACITY	None
11.	REEFER CAPACITY	None
12.	CLEAR CARGO AREA (on deck/below deck)	None
13.	AVERAGE DECK STRENGTH	Not applicable
14.	CARGO/MATERIAL HANDLING CAPACITY	None
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	None
16.	YEAR BUILT, HULL MATERIAL	1960-1978; concrete, steel, wood combinations
17.	CLASSIFICATION SOCIETY STATUS	50% Lloyds registry
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No, but can be added
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	None

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	No
25.	ADDITIONAL PASSENGER BERTHS	None
26.	CONTAINER CAPACITY (size, weight)	475-1500 TEU, 5700-18,000 tonnes
27.	MAINTENANCE AND REPAIR FACILITIES	With ancillary units - complete
28.	SPECIAL CARGO CARRIAGE	None
29.	LARGEST PORTABLE CRANE MOUNTABLE	Revolving, 200 @ 15 m (49 ft) radius
30.	UNDERWAY REPLENISHMENT (yes/no)	No
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY MAINTENANCE SUPPORT

VESSEL TYPE FLOATING DRYDOCK CLASS 38-120 m (125-380 ft)

APPROXIMATE NO. IN SERVICE 17

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Performance of maintenance and repair of ships
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length 38-116 m (125-380 ft) Beam 13-24 m (43-80 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Non-propelled
4.	CRUISING/MAXIMUM SPEEDS	None
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	None
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	Riding crew for towing and ship repair, no accommodations
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 2
8.	VESSEL MANEUVERABILITY	None
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	Lifting capacity 400-5000 tonnes
10.	DRY STORES CAPACITY	None
11.	REEFER CAPACITY	None
12.	CLEAR CARGO AREA (on deck/below deck)	None
13.	AVERAGE DECK STRENGTH	Not applicable
14.	CARGO/MATERIAL HANDLING CAPACITY	None
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	None
16.	YEAR BUILT, HULL MATERIAL	1960-1978, concrete,steel,wood
17.	CLASSIFICATION SOCIETY STATUS	40% Lloyds registry
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	None
20.	TOW WINCH(yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	No, but can be added
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	None

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	No
25.	ADDITIONAL PASSENGER BERTHS	None
26.	CONTAINER CAPACITY (size, weight)	30-300 TEU, 400-5000 tonnes
27.	MAINTENANCE AND REPAIR FACILITIES	With ancillary units - complete
28.	SPECIAL CARGO CARRIAGE	None
29.	LARGEST PORTABLE CRANE MOUNTABLE	Revolving, 100 tonnes @ 10 m(33 ft) radius
30.	UNDERWAY REPLENISHMENT (yes/no)	No
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY FERRY

VESSEL TYPE PASSENGER-VEHICLE FERRY CLASS BAYS, SOUNDS, COASTAL

APPROXIMATE NO. IN SERVICE 27

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Passenger and vehicle ferry in Washington and Alaska
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 30-134 m (99-440 ft) Beam 11-27 m (35-97 ft) Draft (loaded) 2-6 m (6-18 ft) Mast height 15-33 m (48-109 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	Diesel, Diesel/Electric; 470-18,000 BHP, 15-240 gph
4.	CRUISING/MAXIMUM SPEEDS	10-20 Knots @ cruise
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	4-33 days/1000-8000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	10-20 crew, 40-206 vehicles, 60-3500 passengers
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 8
8.	VESSEL MANEUVERABILITY	(4) have controllable pitch propeller, double-ended drive systems
9.	*CARGO DEADWEIGHT (on deck/below deck),* NET CUBIC CAPACITY (dry/liquid)	Covered passenger and vehicle space, 3-5 m (11-16 ft) vehicle deck clearance
10.	DRY STORES CAPACITY	None
11.	REEFER CAPACITY	None
12.	CLEAR CARGO AREA (on deck/below deck)	400-2000 m^2 (4000-20,000 ft^2) below deck
13.	AVERAGE DECK STRENGTH	250 kg/m^2 (51.2 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	All have bow and stern ramps; (6) have side doors.
15.	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Radar, VHF radio
16.	YEAR BUILT, HULL MATERIAL	1930-1977, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS A-1 Ferry, AMS, ACCU
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	None
19.	EXTERNAL FIREFIGHTING CAPABILITY	No
20.	TOW WINCH (yes/no), BOLLARD PULL	No
21.	HELIPAD (yes/no)	Possible on 50%
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	None

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	No
25.	ADDITIONAL PASSENGER BERTHS	None
26.	CONTAINER CAPACITY (size, weight)	(20-100) 12 m (40 ft) trailer units
27.	MAINTENANCE AND REPAIR FACILITIES	None
28.	SPECIAL CARGO CARRIAGE	None
29.	LARGEST PORTABLE CRANE MOUNTABLE	None
30.	UNDERWAY REPLENISHMENT (yes/no)	No
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

INDUSTRY OFFSHORE SALVAGE

VESSEL TYPE SALVAGE SHIP CLASS

APPROXIMATE NO. IN SERVICE 2

CANDIDATE VESSEL CHARACTERISTICS

A. GENERAL SERVICE PARTICULARS

1.	NORMAL SERVICE FUNCTIONS	Offshore salvage and towing, coastal salvage, and inland harbor clearance work
2.	LENGTH, BEAM, DEPTH, DRAFT, OVERALL HEIGHT ABOVE WATER	Length overall 57-60 m (190-200 ft) Beam 10-12 m (34-39 ft) Depth 3-6 m (11-19 ft) Draft 2-5 m (9-17 ft) Height 28 m (92 ft)
3.	PROPULSION TYPE, TOTAL HORSEPOWER, FUEL REQUIREMENT	1 Diesel, 1 Diesel/Electric; 3600-3800 BHP, No. 2 Diesel fuel
4.	CRUISING/MAXIMUM SPEEDS	12/15 Knots
5.	ENDURANCE (days/miles) AT ABOVE SPEEDS	14-32 days/5000-9000 miles
6.	REQUIRED CREW COMPLEMENT, TOTAL ACCOMMODATIONS	24 vessel crew, 0-16 salvage crew, 49 total crew
7.	MAXIMUM SEA STATE IN WHICH VESSEL CAN OPERATE	Beaufort 5
8.	VESSEL MANEUVERABILITY	Twin screw/twin rudder
9.	CARGO DEADWEIGHT (on deck/below deck), NET CUBIC CAPACITY (dry/liquid)	250/50 tonnes, 400/200 m^3 (14,120/7060 ft^3)
10	DRY STORES CAPACITY	Crew consumables only
11.	REEFER CAPACITY	Crew consumables only
12.	CLEAR CARGO AREA (on deck/below deck)	150-200 m^2 (1620-2160 ft^2) space below deck
13.	AVERAGE DECK STRENGTH	1500 kg/m^2 (300 lb/ft^2)
14.	CARGO/MATERIAL HANDLING CAPACITY	2 booms Forward rated @ 15 tonnes. 1 boom Aft rated @ 7.5 tonnes.
15	NAVIGATION/COMMUNICATION EQUIPMENT INSTALLED	Radar; LORAN; RDF; SW, SSB, VHF radios
16.	YEAR BUILT, HULL MATERIAL	1943, steel
17.	CLASSIFICATION SOCIETY STATUS	ABS Class, A-1 Towing and Salvage
18.	FRESH WATER MAKING AND WASHDOWN CAPABILITY	4 tonnes/day, salt water washdown only
19.	EXTERNAL FIREFIGHTING CAPABILITY	(4) 6.4 cm hose stations
20.	TOW WINCH (yes/no), BOLLARD PULL	Yes, winch line pull 20 tonnes; Vessel bollard pull 30 tonnes.
21.	HELIPAD (yes/no)	No
22.	ICE STRENGTHENING (yes/no)	No
23.	MISCELLANEOUS FEATURES	None

B. VESSEL ADAPTABILITY

24.	CONVERTIBILITY OF TANKS FOR FUEL, OTHER LIQUIDS	No
25.	ADDITIONAL PASSENGER BERTHS	10-15
26.	CONTAINER CAPACITY (size, weight)	None
27.	MAINTENANCE AND REPAIR FACILITIES	Full machine shop with steel and wood stocks. Diving capability includes under water burning and welding
28.	SPECIAL CARGO CARRIAGE	None
29.	LARGEST PORTABLE CRANE MOUNTABLE	None
30.	UNDERWAY REPLENISHMENT (yes/no)	Yes
31.	OTHER POSSIBLE FEATURES	

C. BARGE CHARACTERISTICS ONLY

32.	CONFIGURATION OF BOW	
33.	COMPARTMENTATION BELOW DECK	
34.	TYPE OF SKEGS	
35.	MISCELLANEOUS FEATURES	

D. DERRICK/CRANE BARGE CHARACTERISTICS ONLY

36.	CAPACITY IN EACH MODE	

E. DREDGE CHARACTERISTICS ONLY

37.	CAPACITY OF MAIN EQUIPMENT	

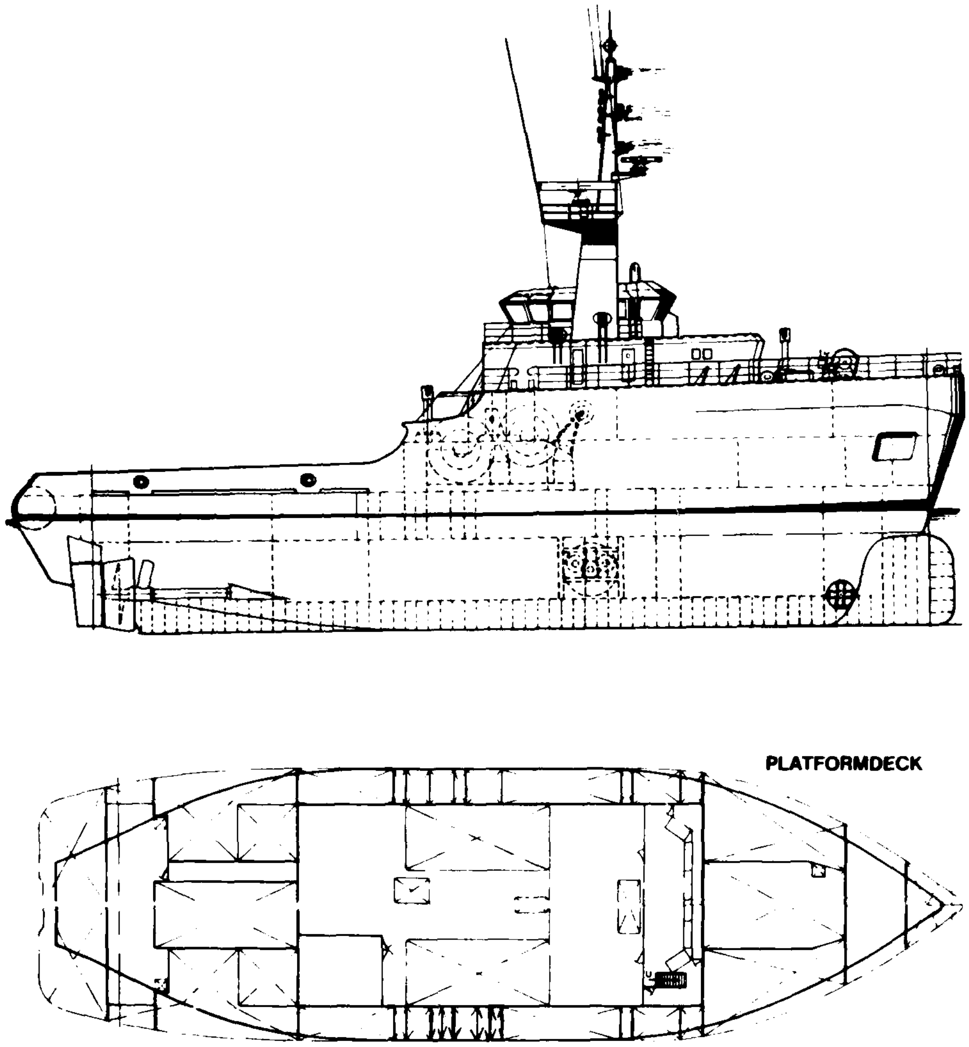

FIGURE A-1 Ocean Tug, 9,000-10,999 bhp (6,700-8,200 kW)

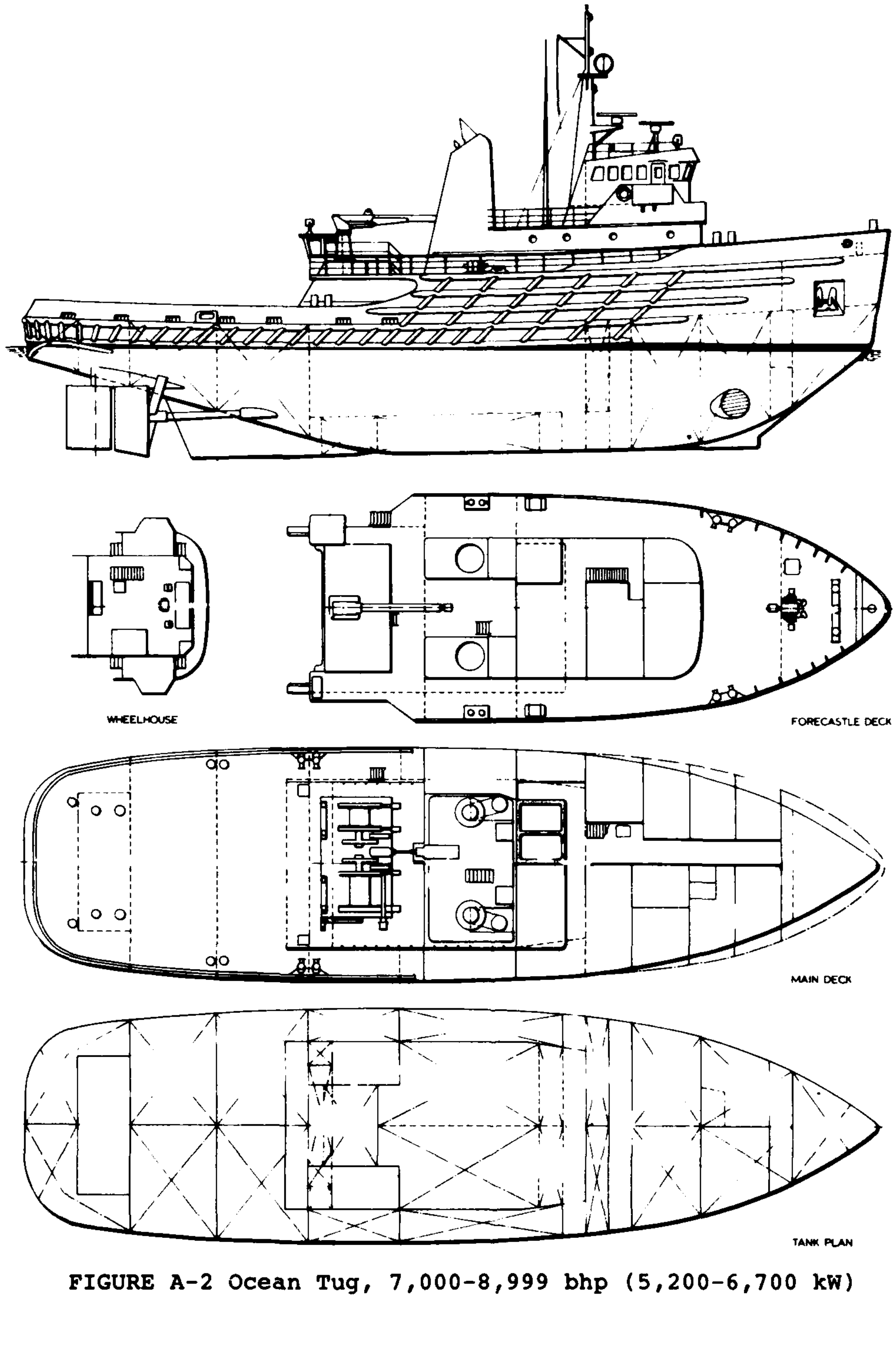

FIGURE A-2 Ocean Tug, 7,000-8,999 bhp (5,200-6,700 kW)

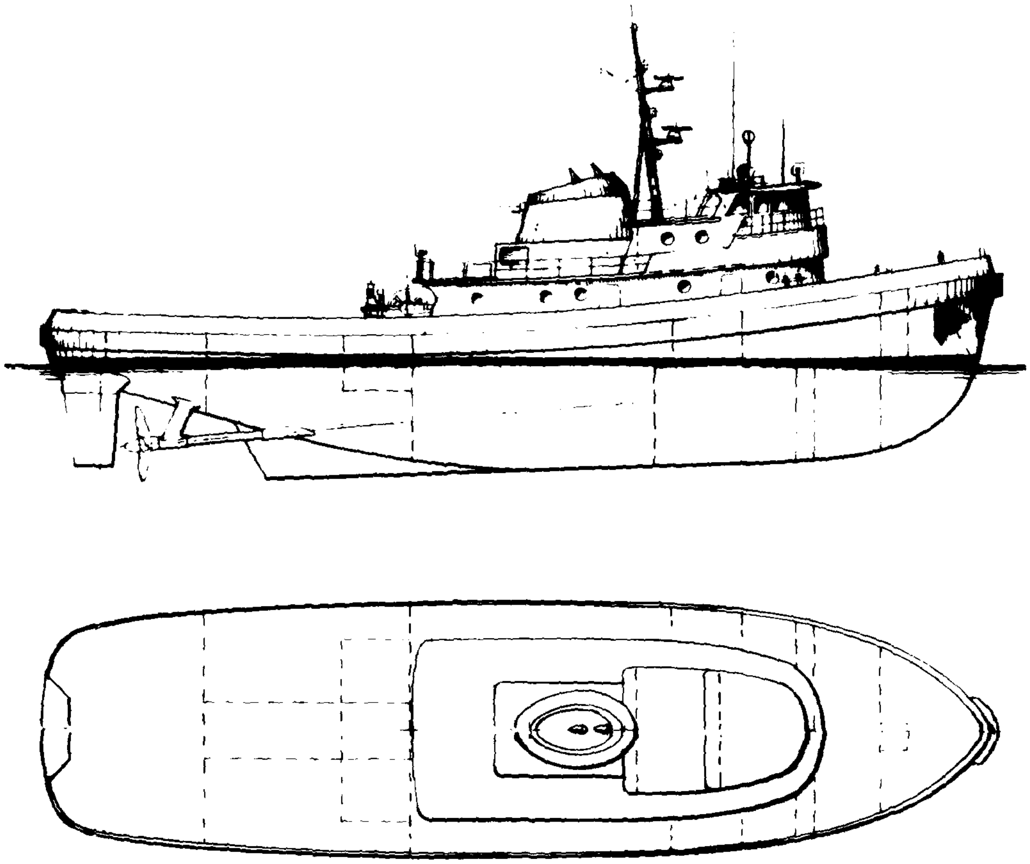

FIGURE A-3 Ocean Tug, 5,000-6,999 bhp (3,750-5,200 kW)

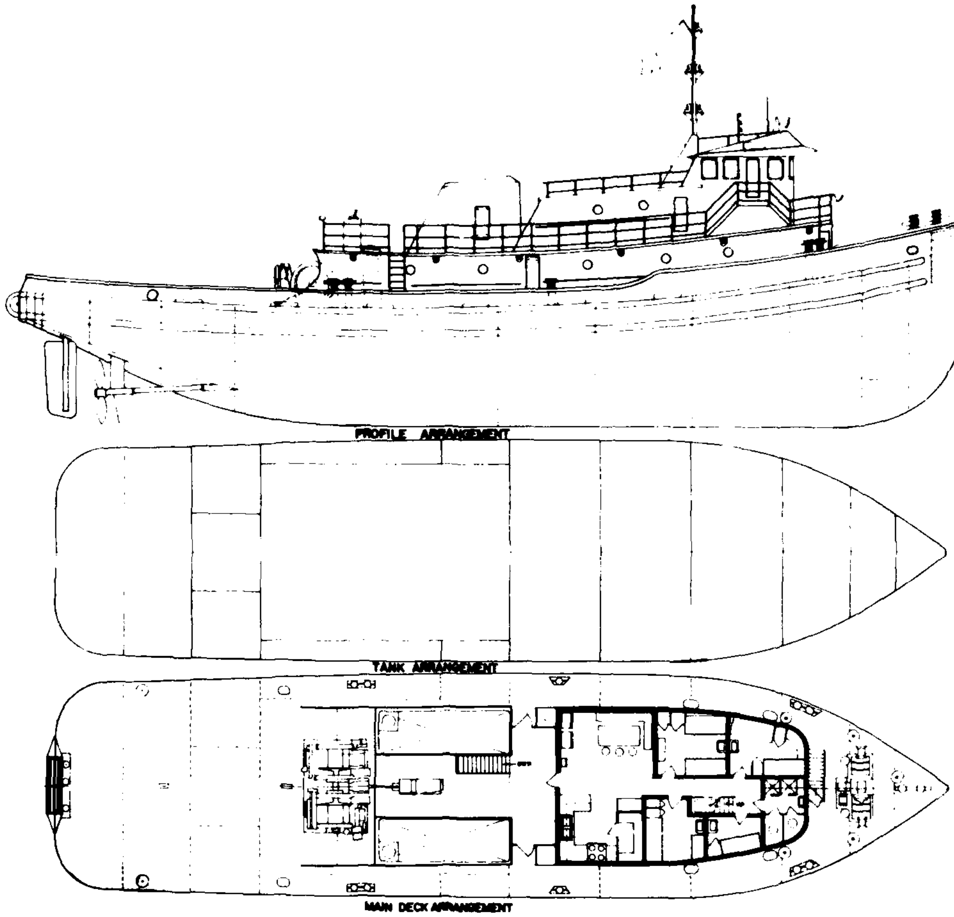

FIGURE A-4 Ocean Tug, 4,000-4,999 bhp (3,000-3,750 kW)

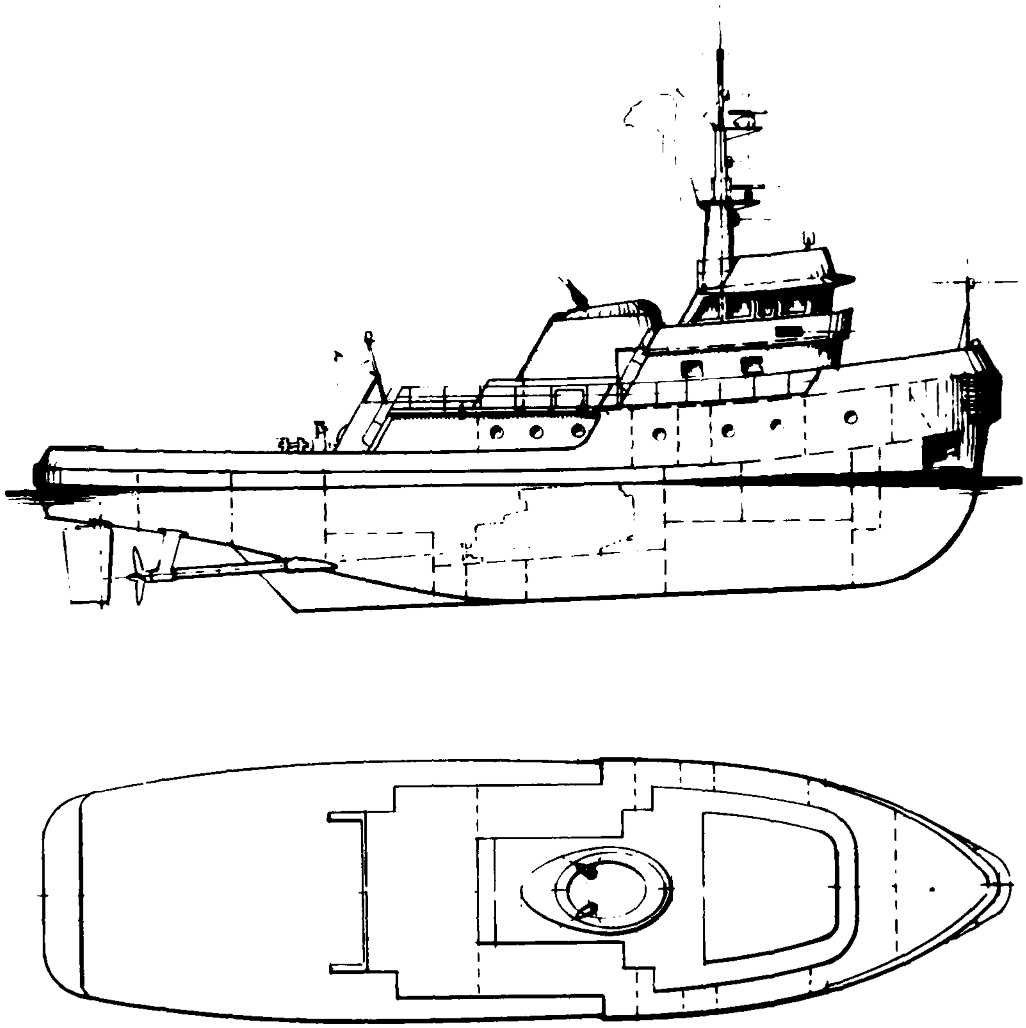

FIGURE A-5 Ocean Tug, 3,000-3,999 bhp (2,250-3,000 kW)

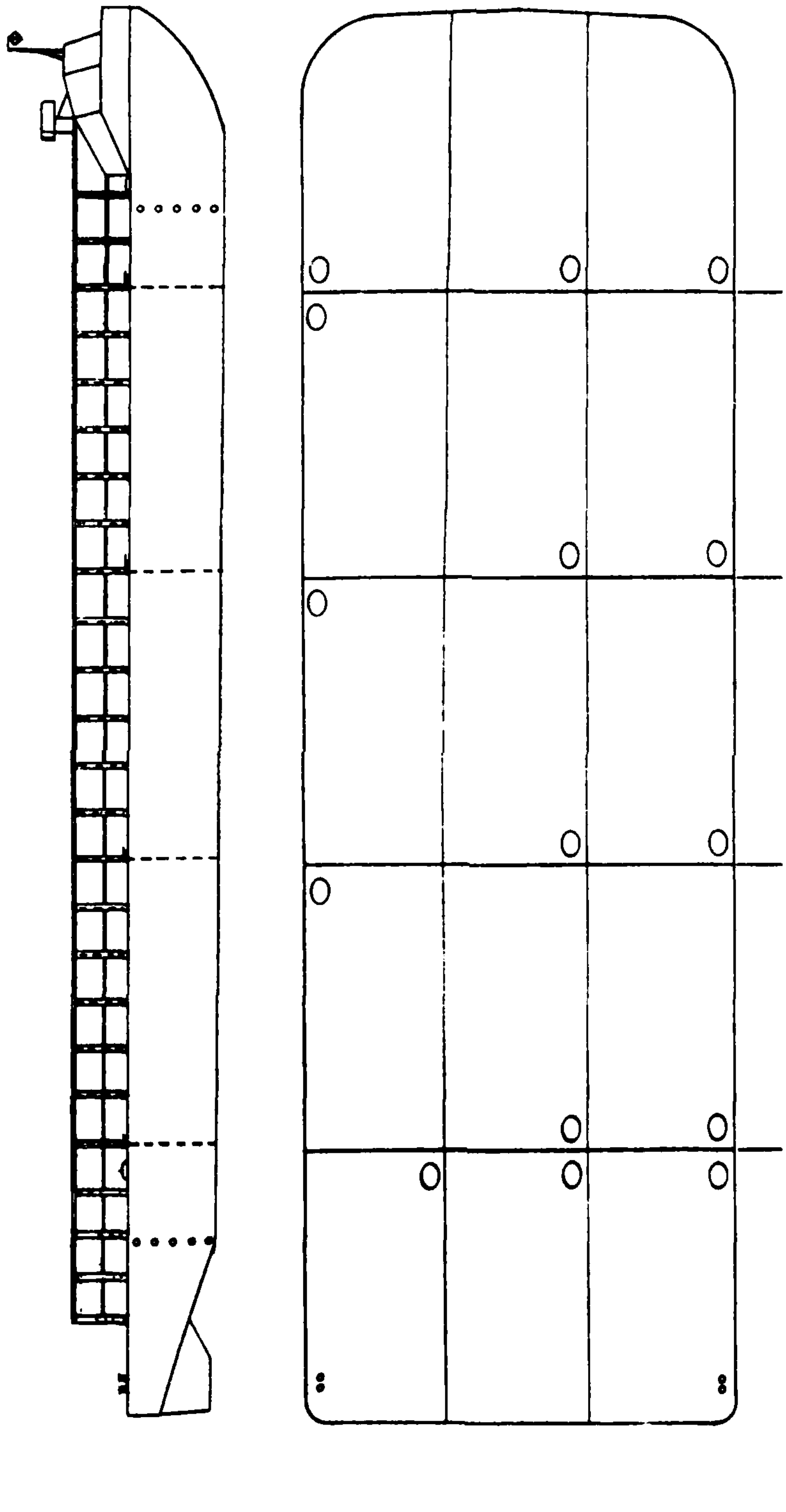

FIGURE A-6 Deck Barge, Ocean Service

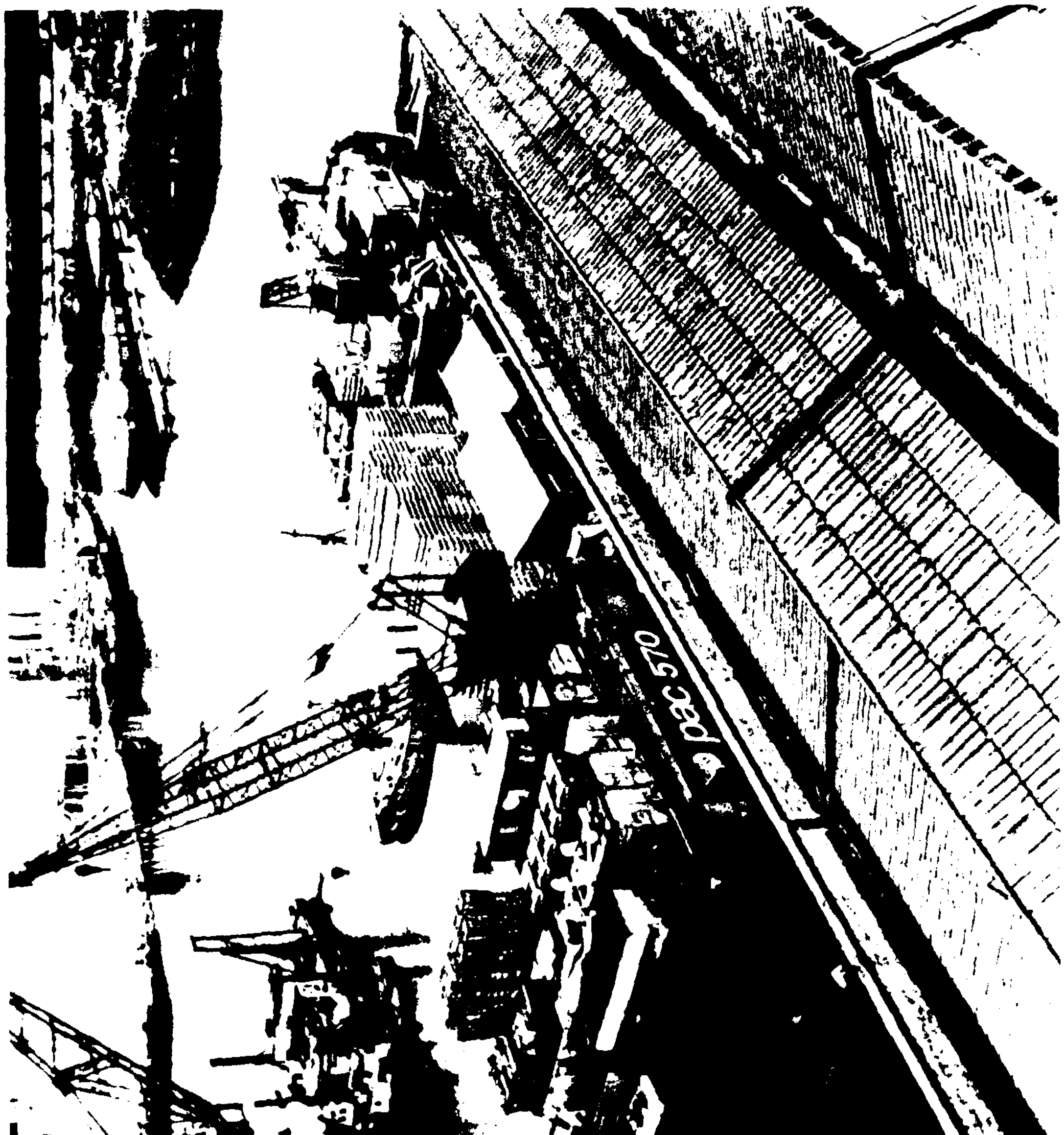

FIGURE A-7 Self-Unloading Deck Barge, Ocean Service

FIGURE A-8 Roll-On, Roll-Off Trailer Barge, Ocean Service

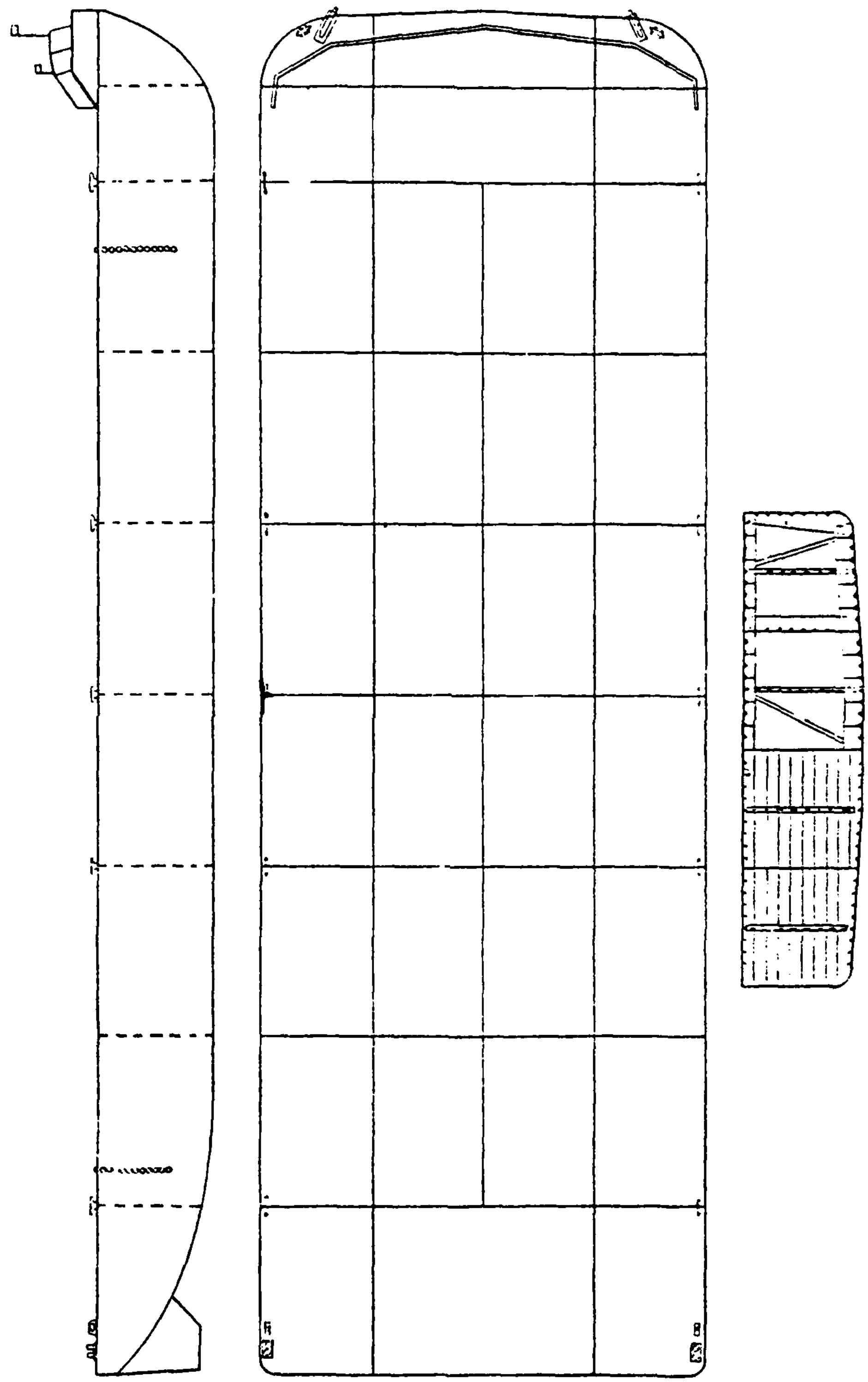

FIGURE A-9 Tank Barge, Ocean Service

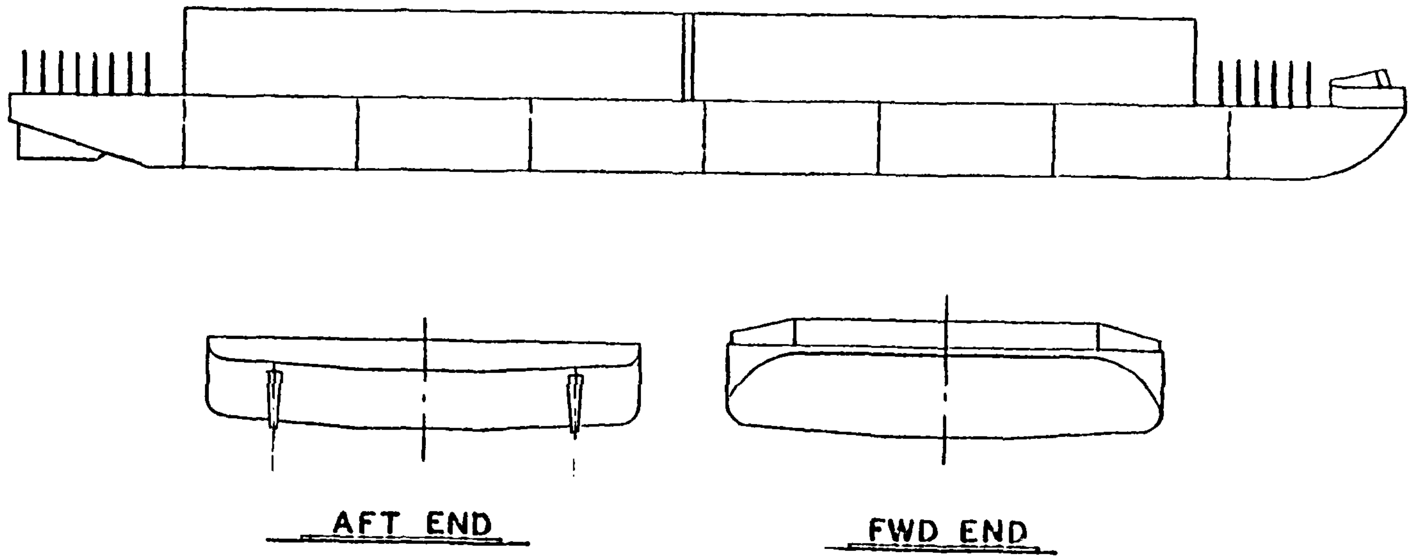

FIGURE A-10 House Barge, Ocean Service

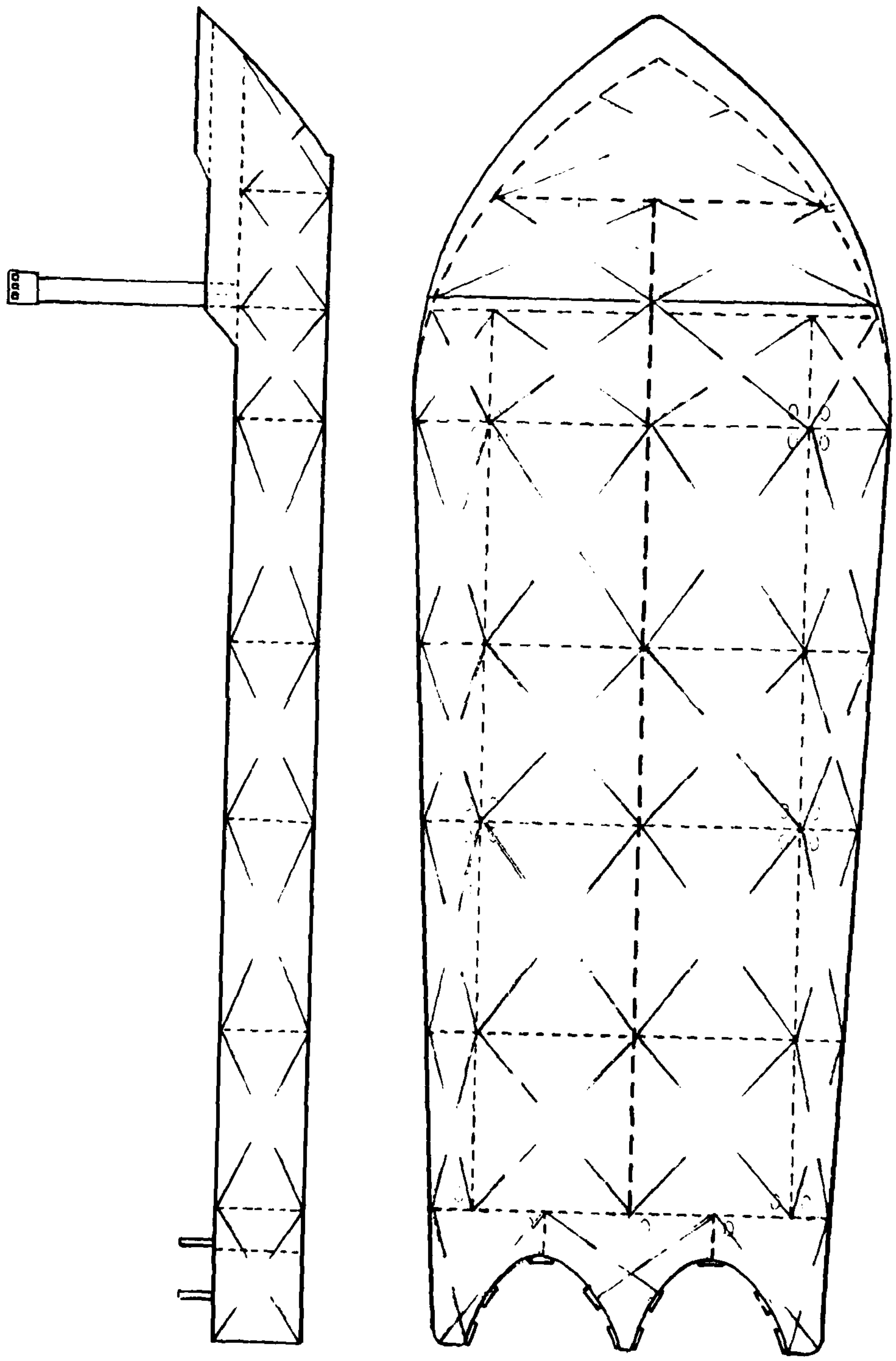

FIGURE A-11 Ice-Breaking Tank Barge

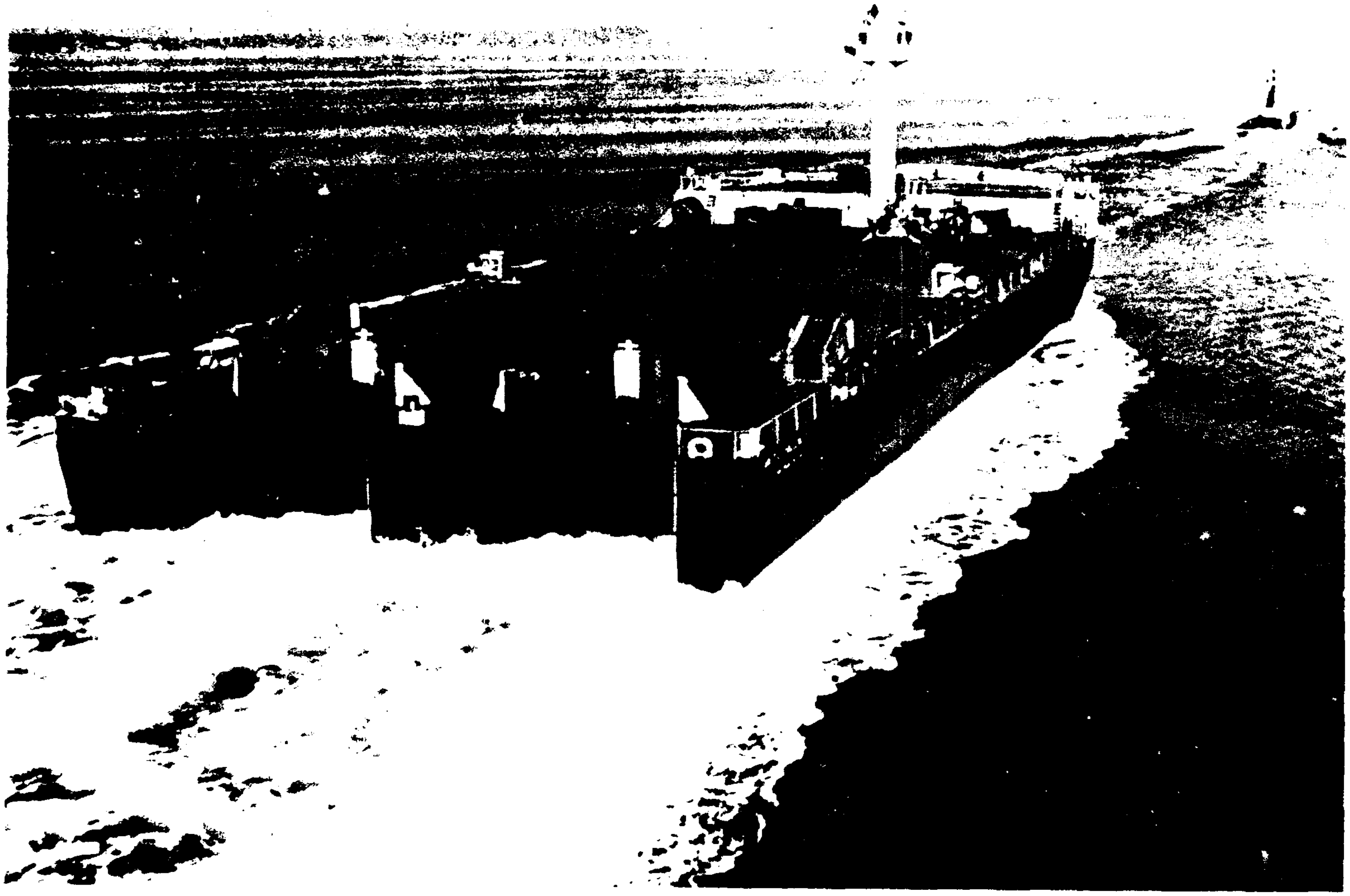

FIGURE A-12 Ice-Breaking Tank Barge

FIGURE A-13 Ice-Breaking Tank Barge

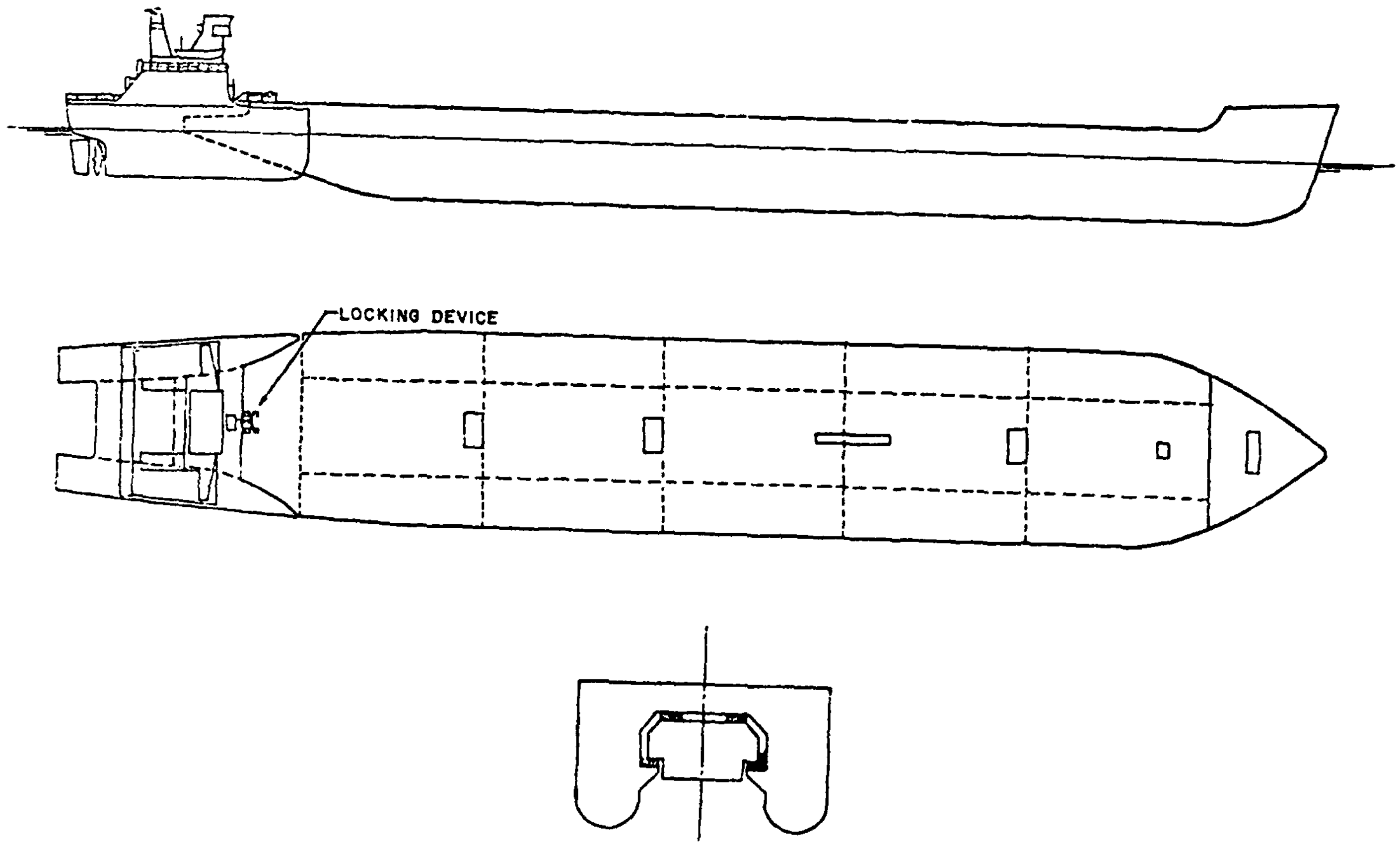

FIGURE A-14 Integrated Tug-Barge, Ocean Service

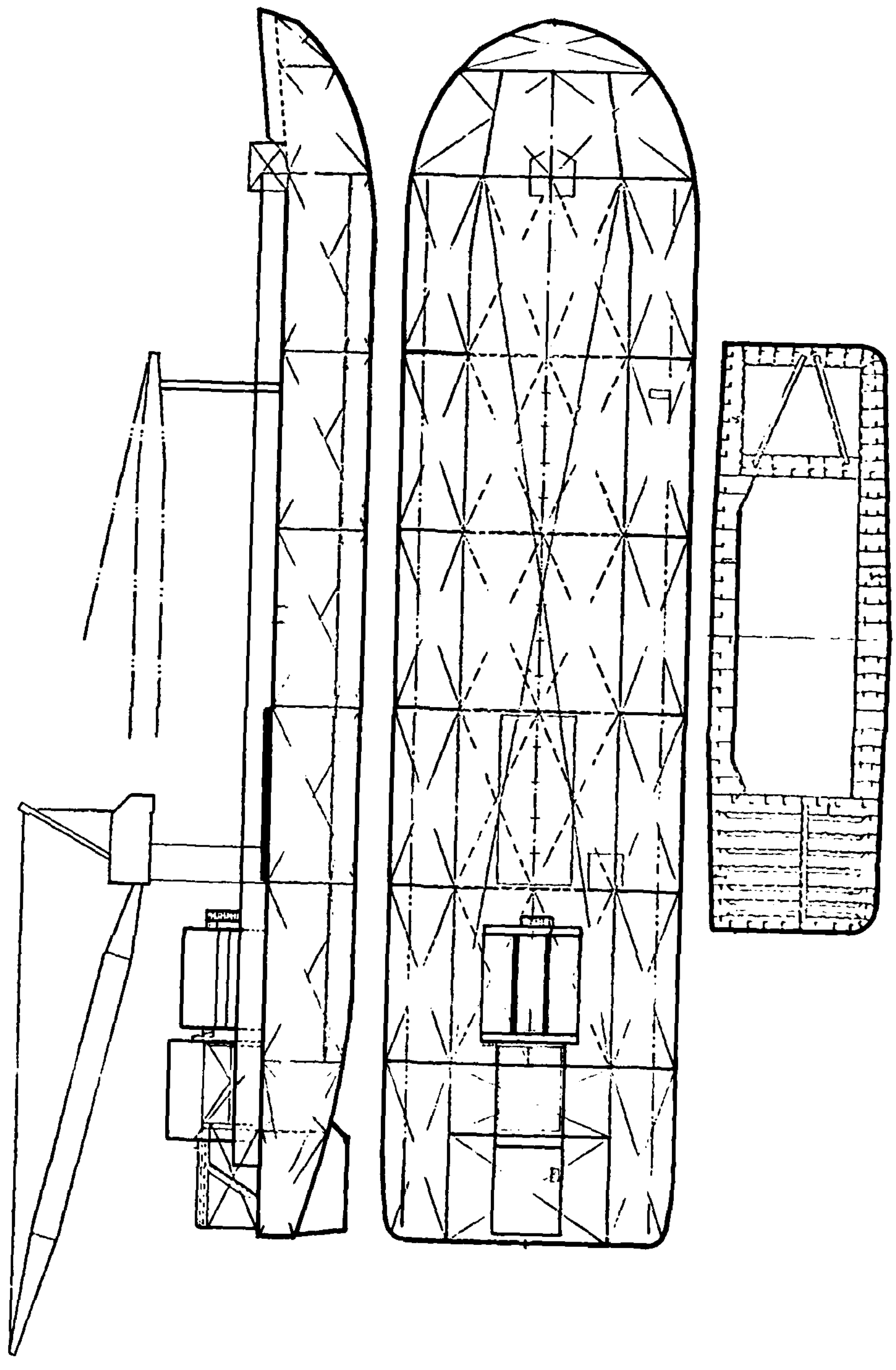

FIGURE A-15 Crane/Derrick Barge

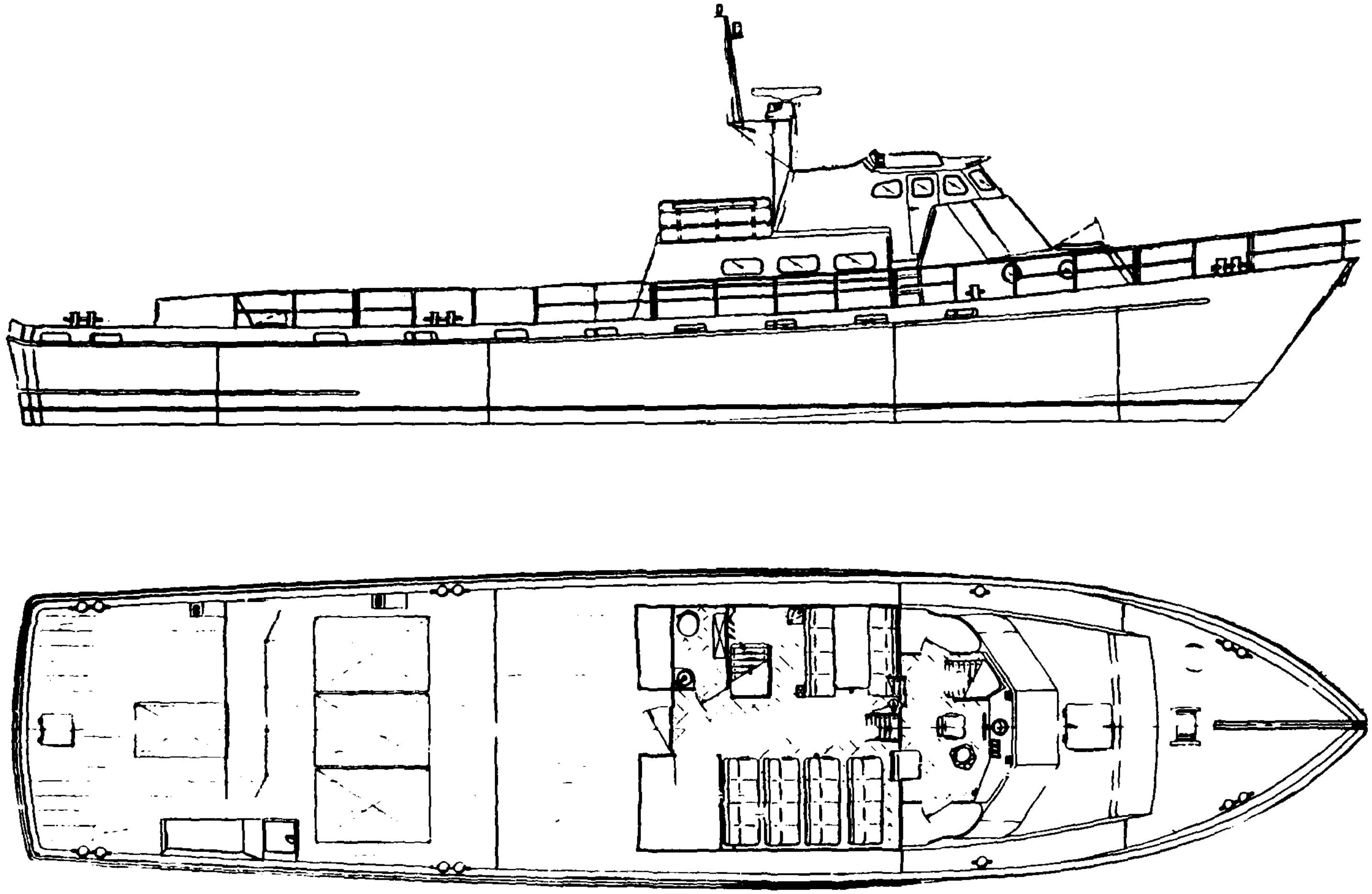

FIGURE A-16 Crew Boat, 30.4-39.6 m (100-130 ft)

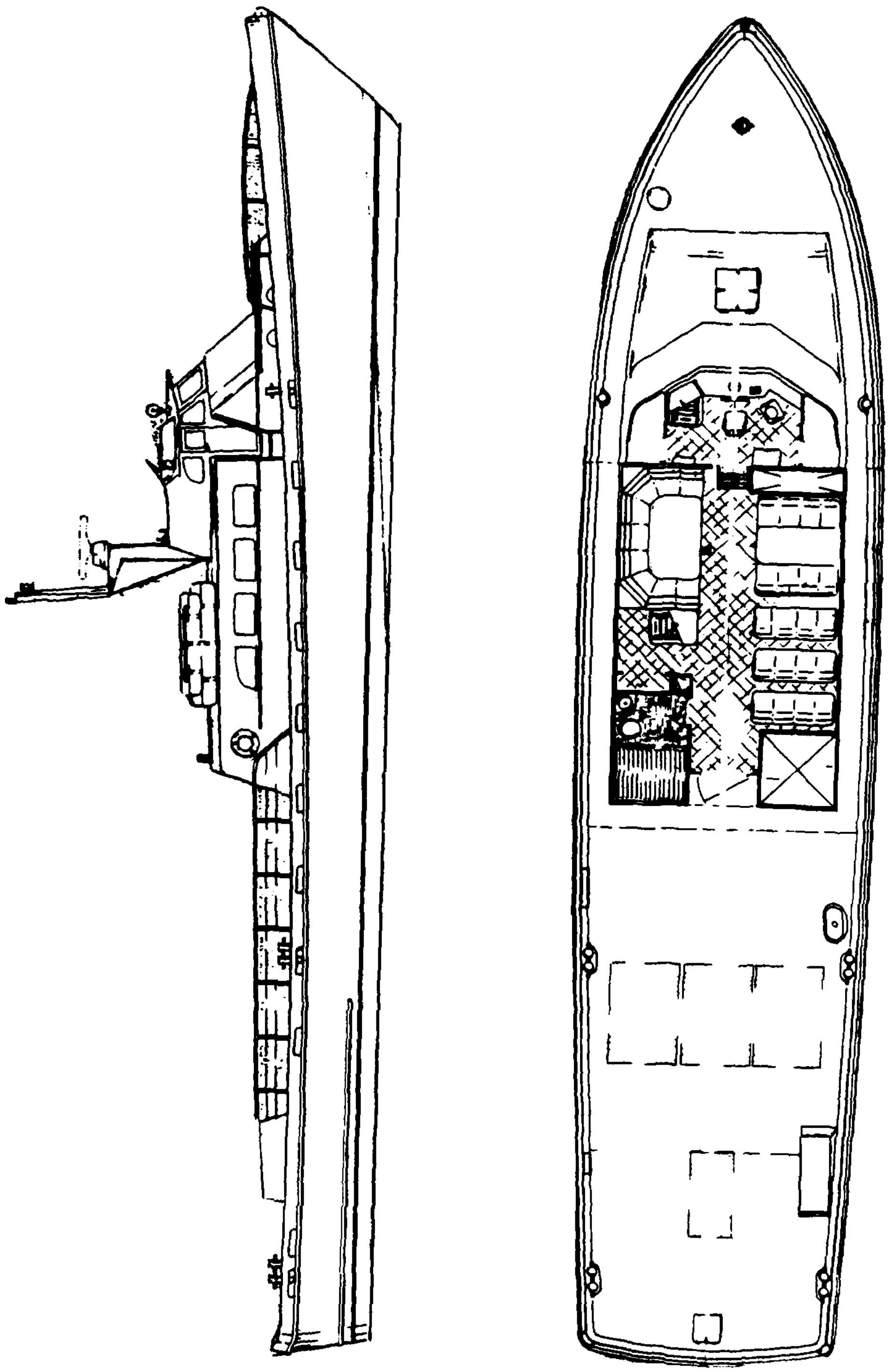

FIGURE A-17 Crew Boat, 25.9-30.3 m (85-99 ft)

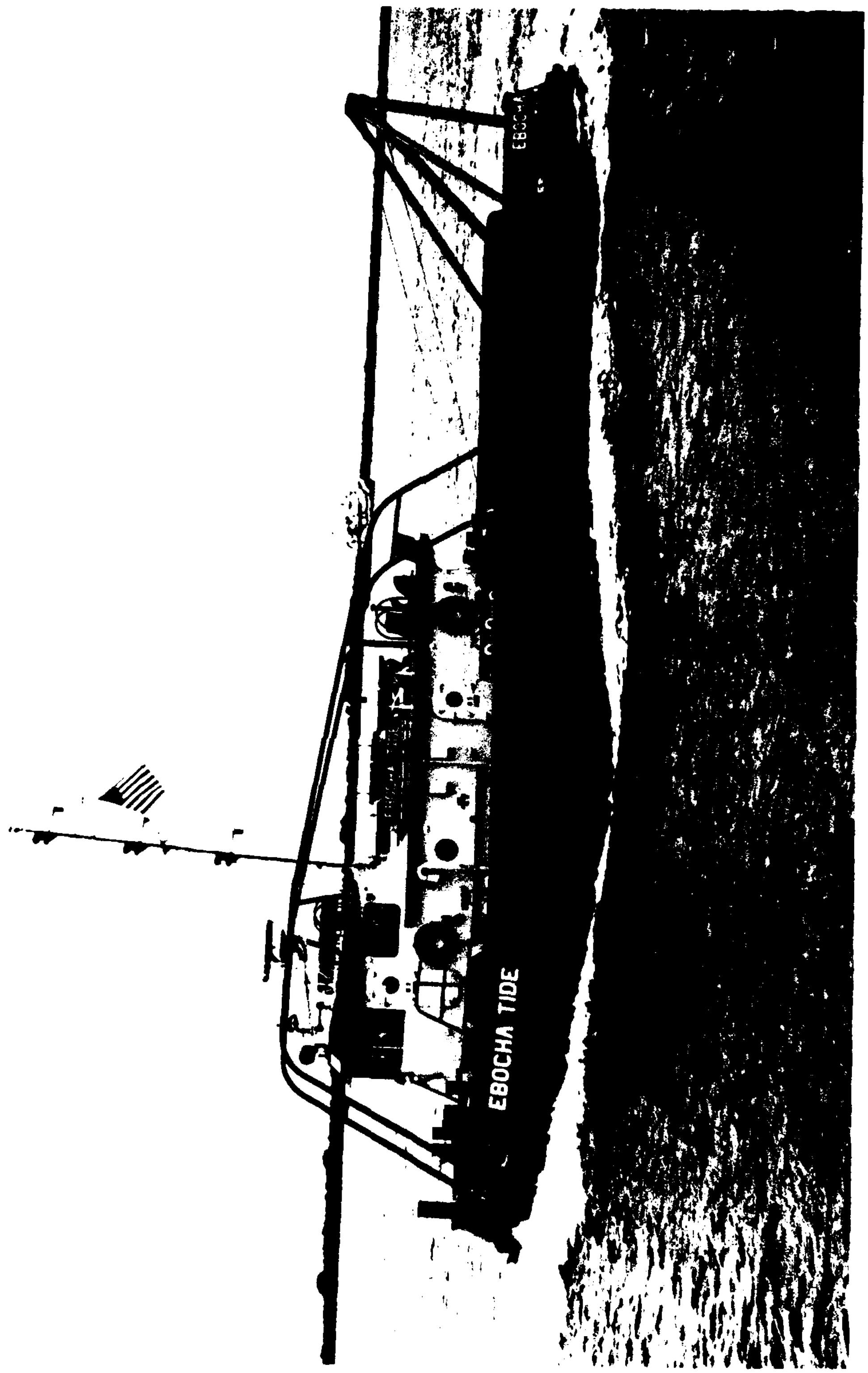

FIGURE A-18 Utility Boat

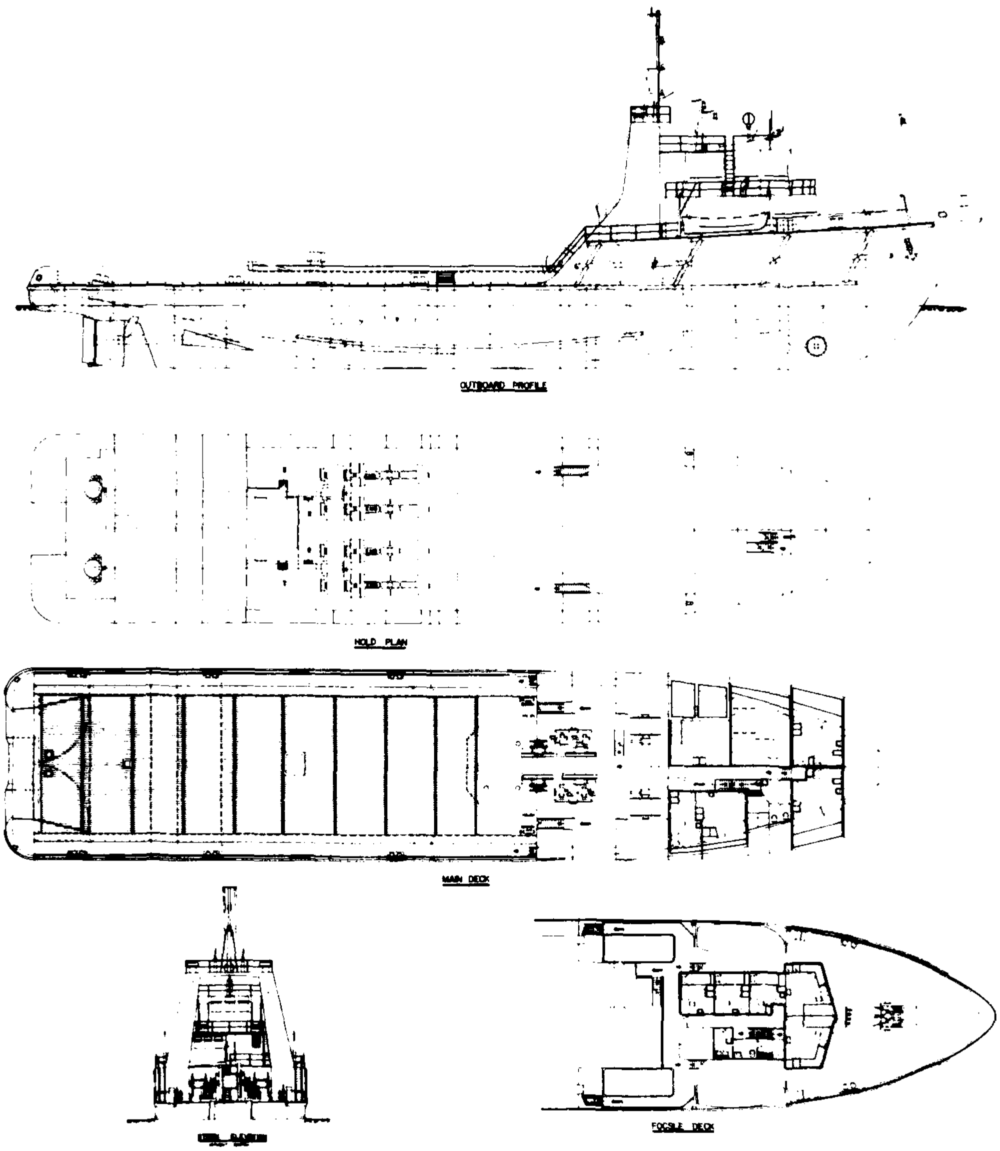

FIGURE A-19 Towing-Supply (Tug-Supply) Vessel, 61.0-66.4 m (200-218 ft)

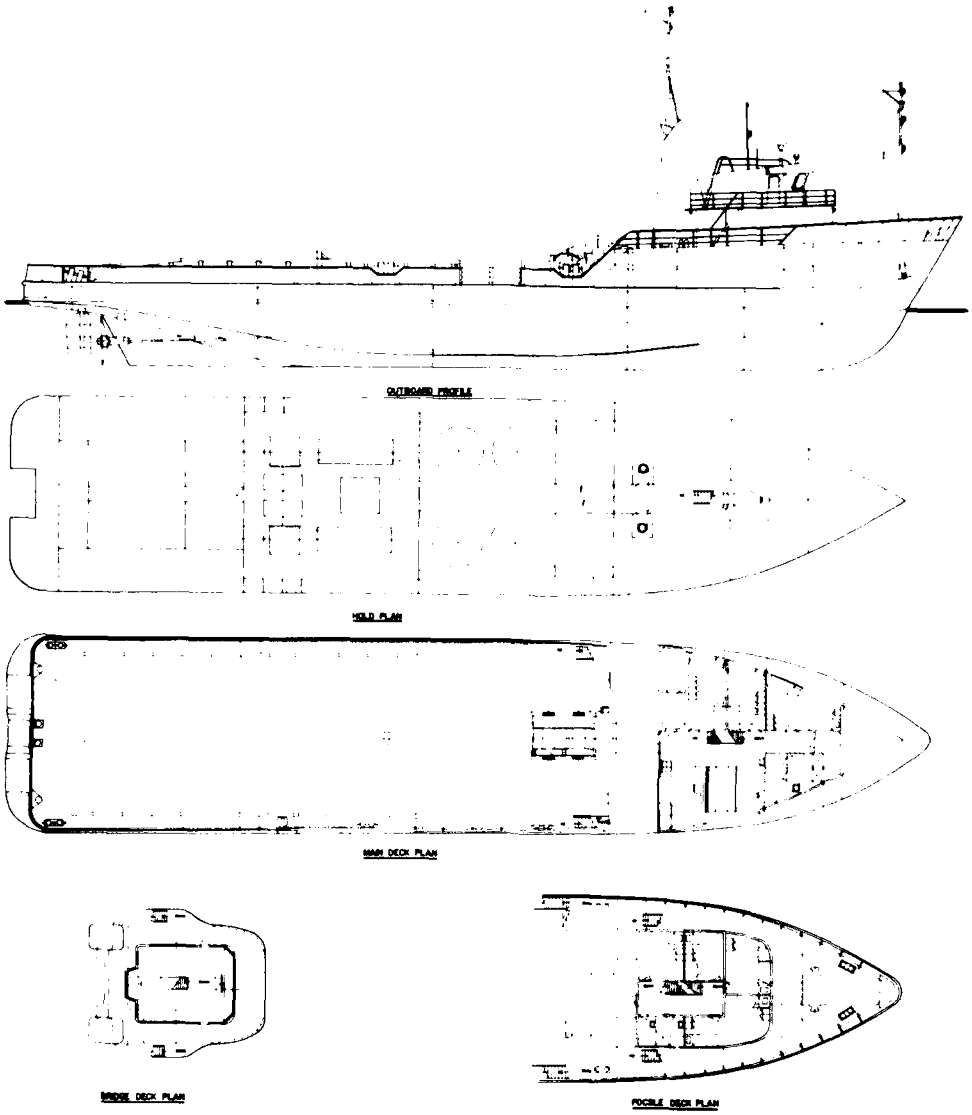

FIGURE A-20 Towing-Supply (Tug-Supply) Vessel, 58.5-59.1 m (192-194 ft)

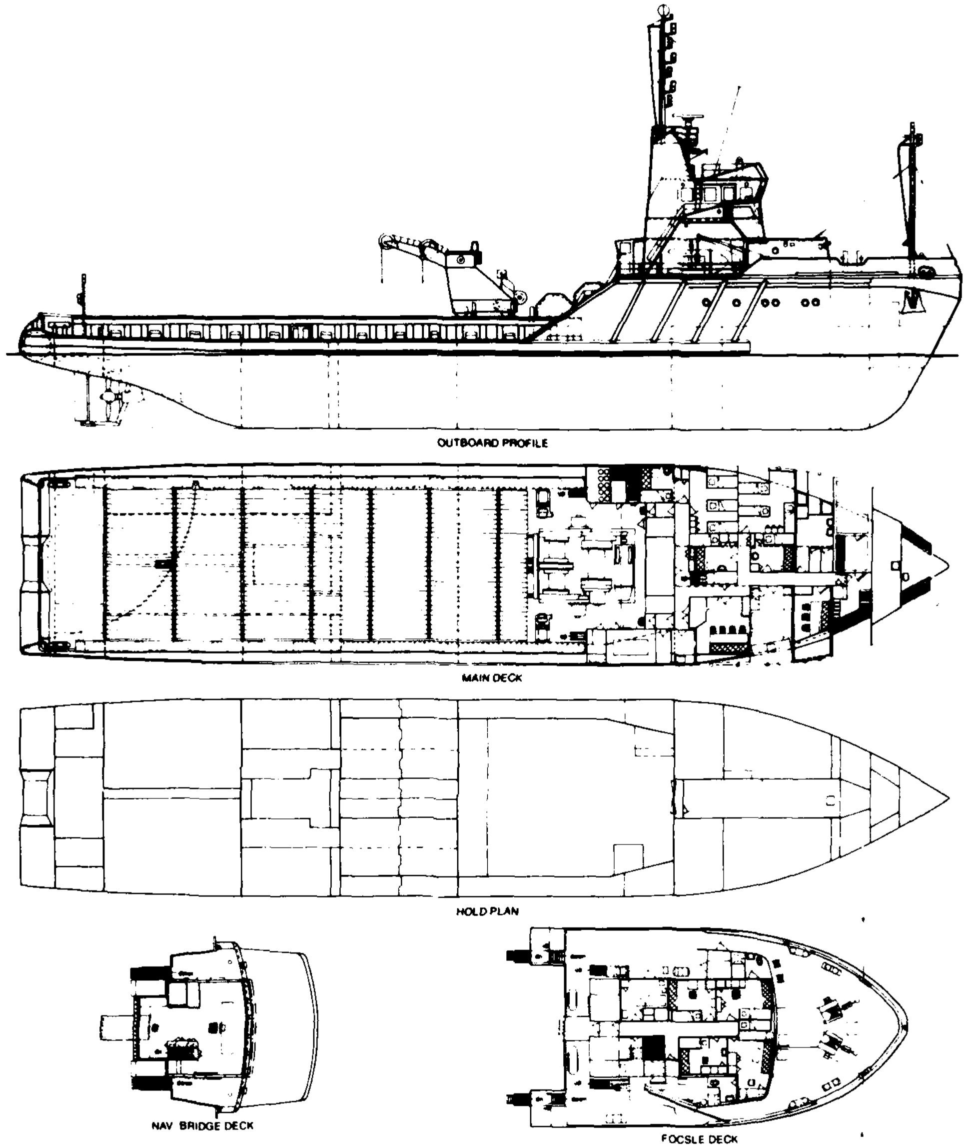

FIGURE A-21 Towing-Supply (Tug-Supply) Vessel, 56.4-57.9 m (185-190 ft)

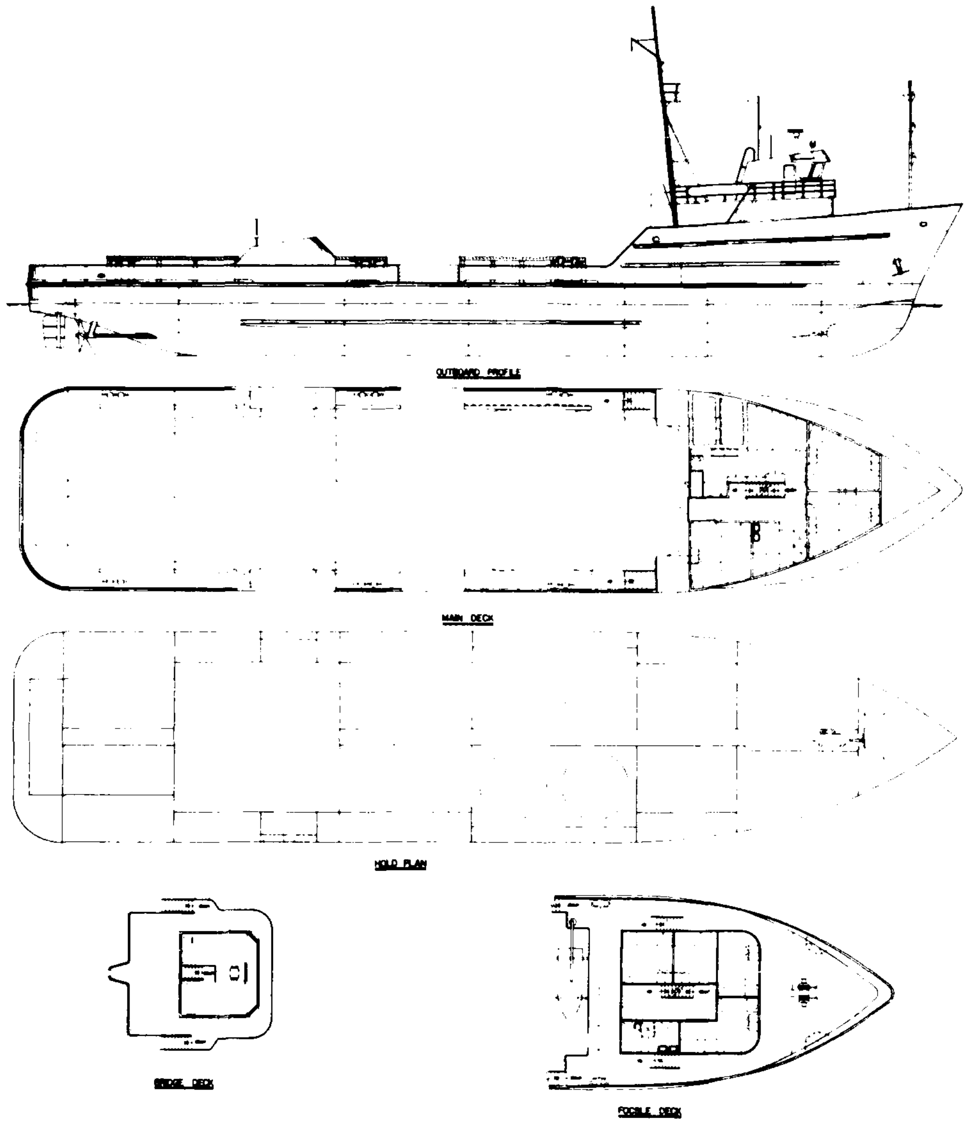

FIGURE A-22 Towing-Supply (Tug-Supply) Vessel, 54.8 m (180 ft)

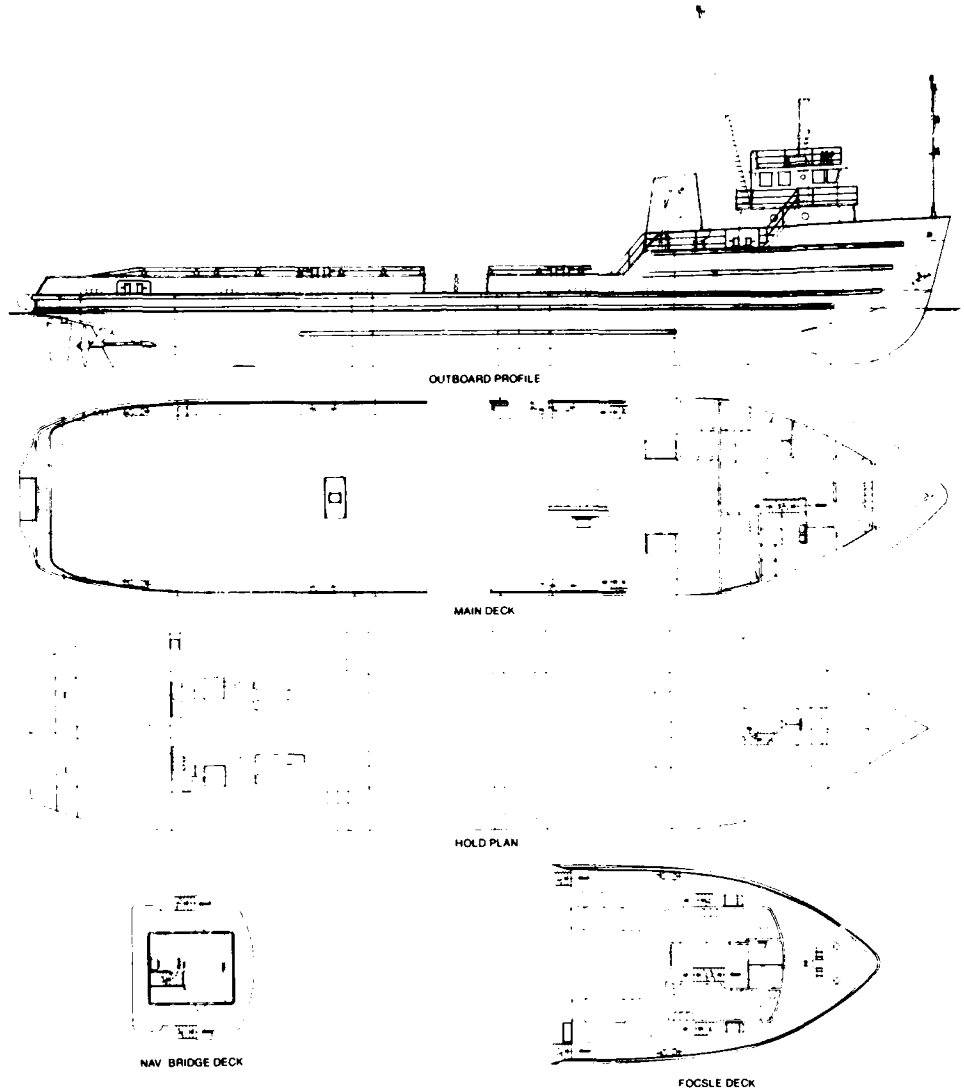

FIGURE A-23 Towing-Supply (Tug-Supply) Vessel, 51.8-53.3 m (170-175 ft)

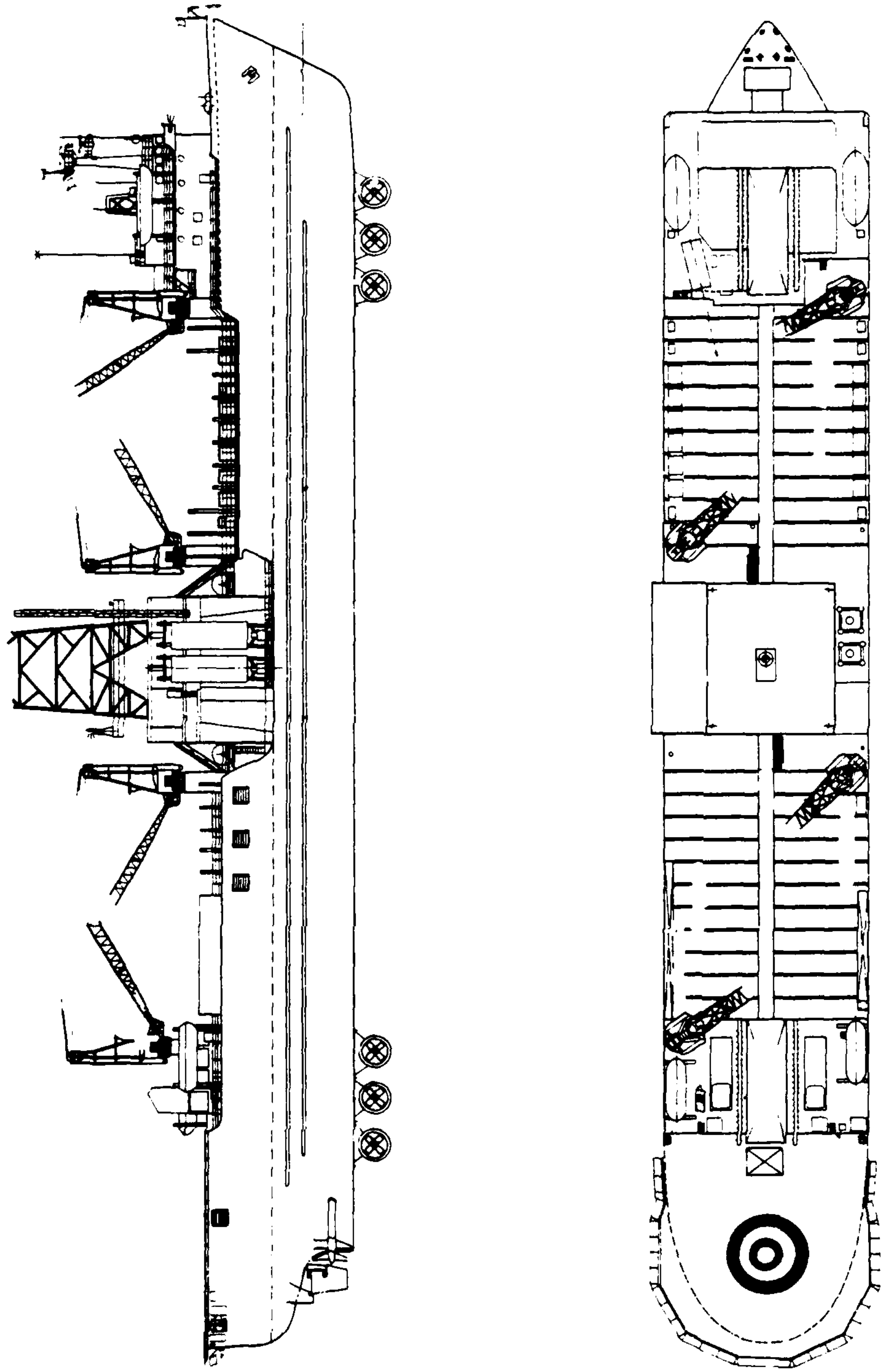

FIGURE A-24 Drillship

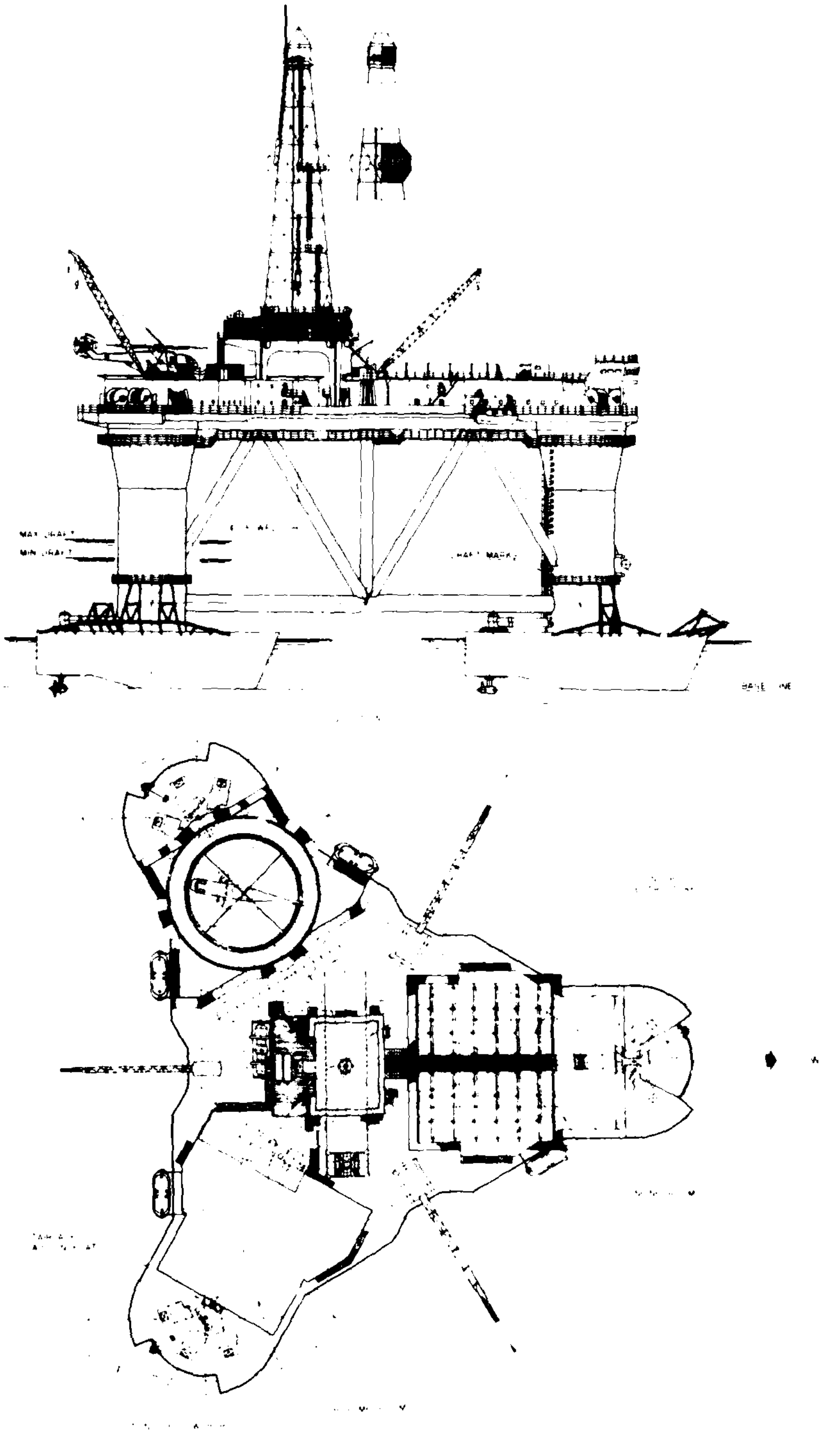

FIGURE A-25 Self-Propelled Semisubmersible

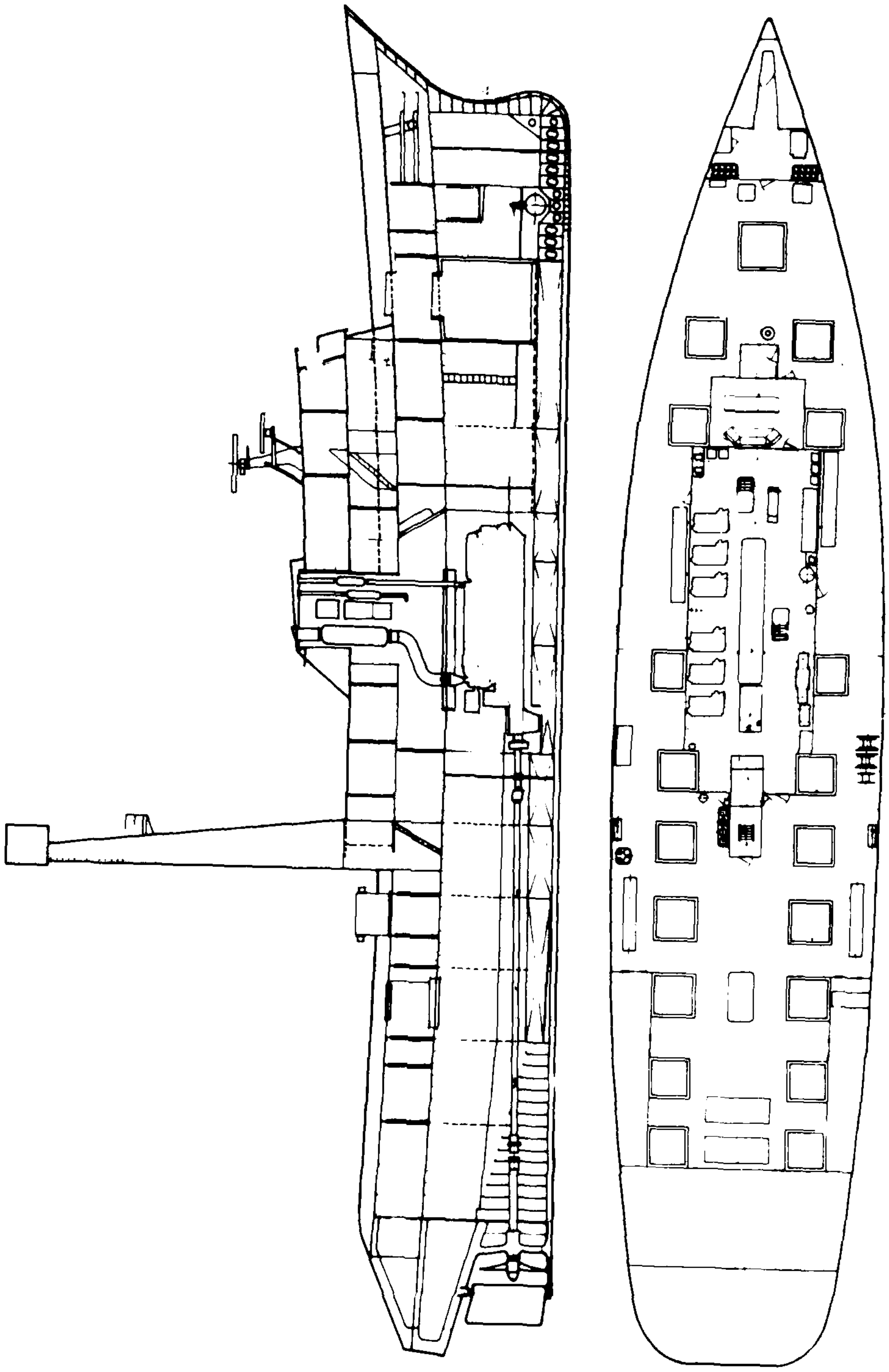

FIGURE A-26 Tuna Seiner

AD-A087 015 NATIONAL RESEARCH COUNCIL WASHINGTON D C MARITIME TRA--ETC F/G 13/10
DEFENSE UTILITY OF COMMERCIAL VESSELS AND CRAFT.(U)
1980 J F WING, S L WALTON N00014-75-C-0711

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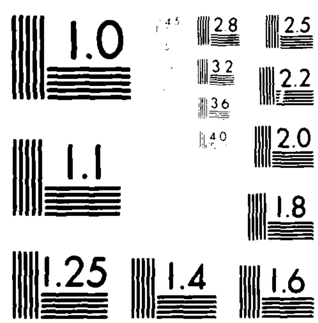

MICROCOPY RESOLUTION TEST CHART

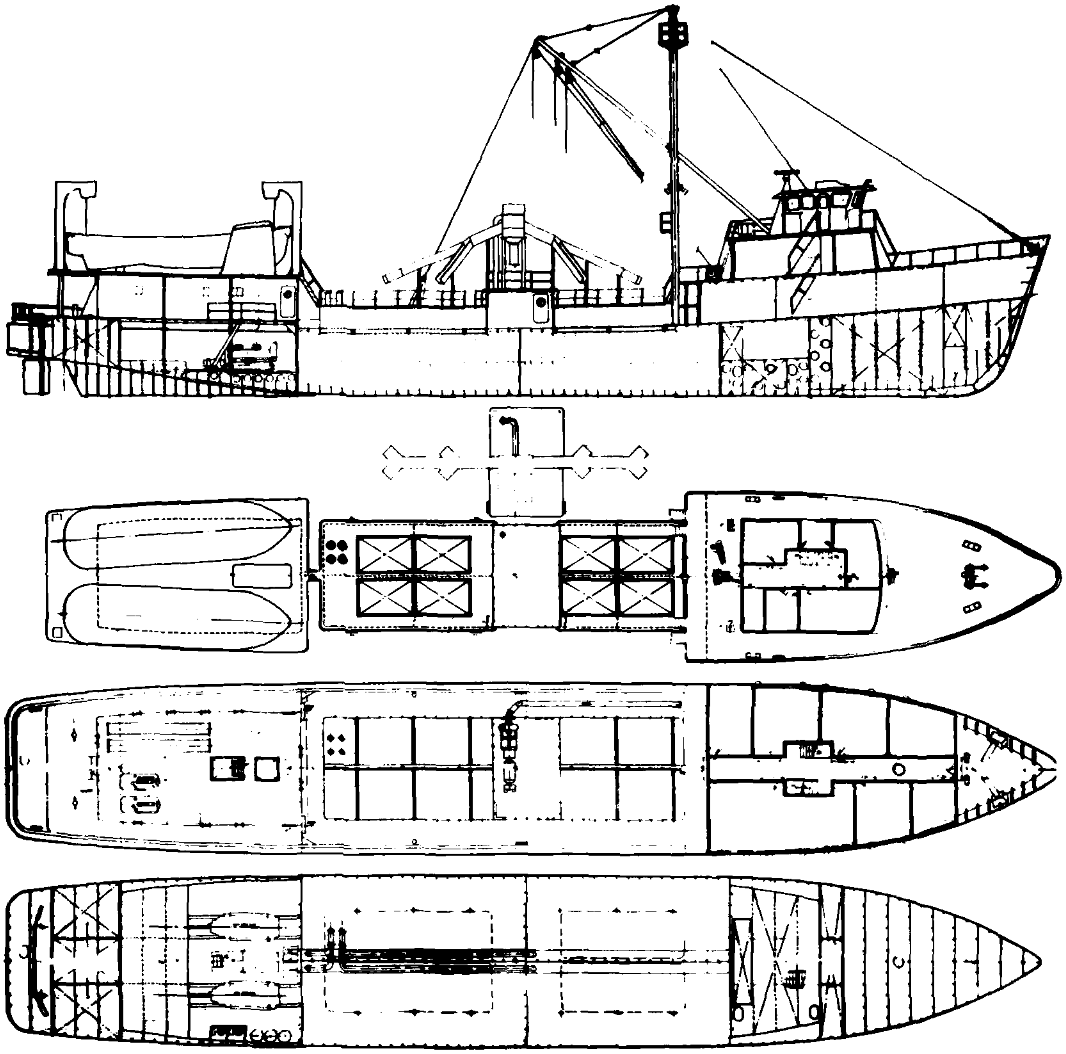

FIGURE A-27 Menhaden Vessel

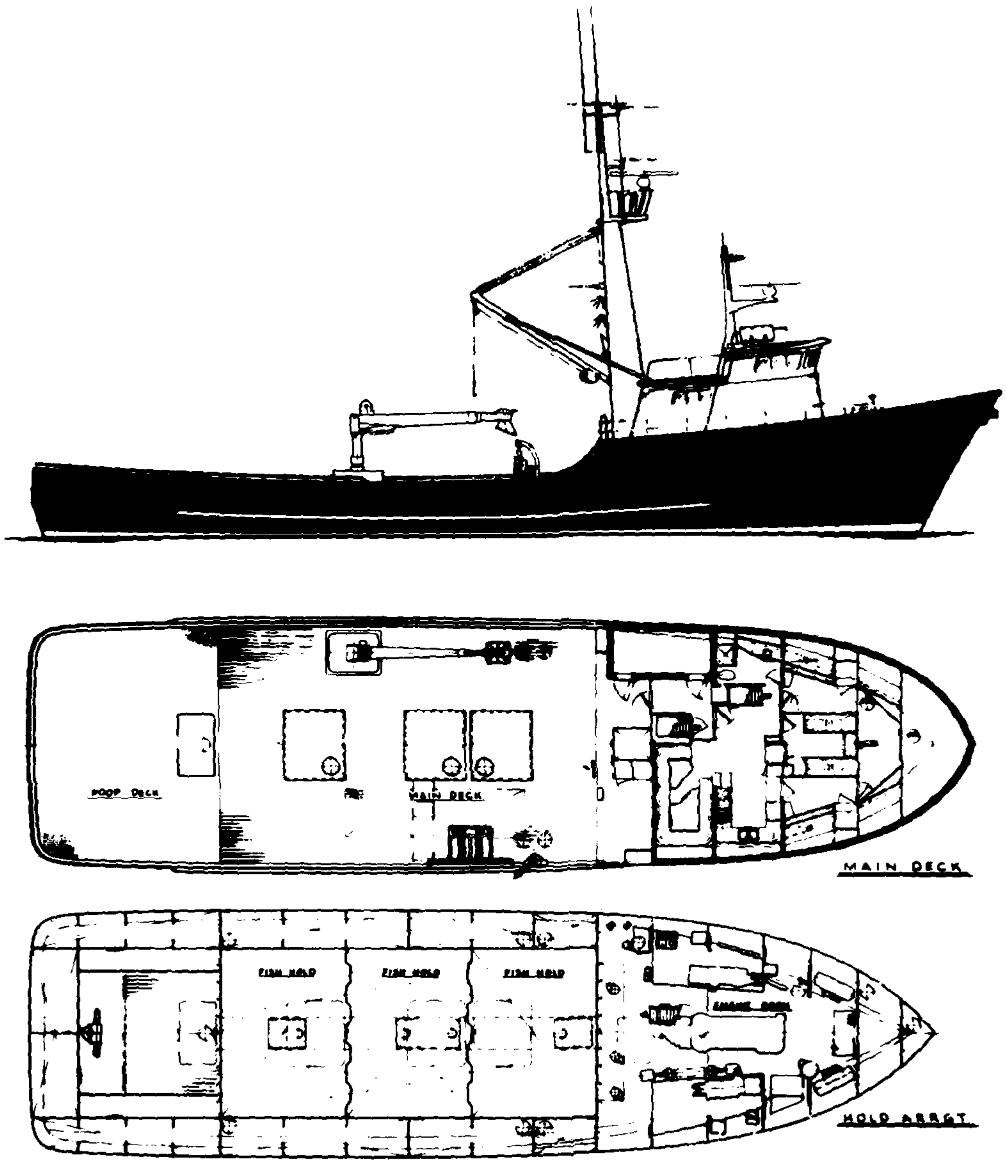

FIGURE A-28 King Crab Vessel

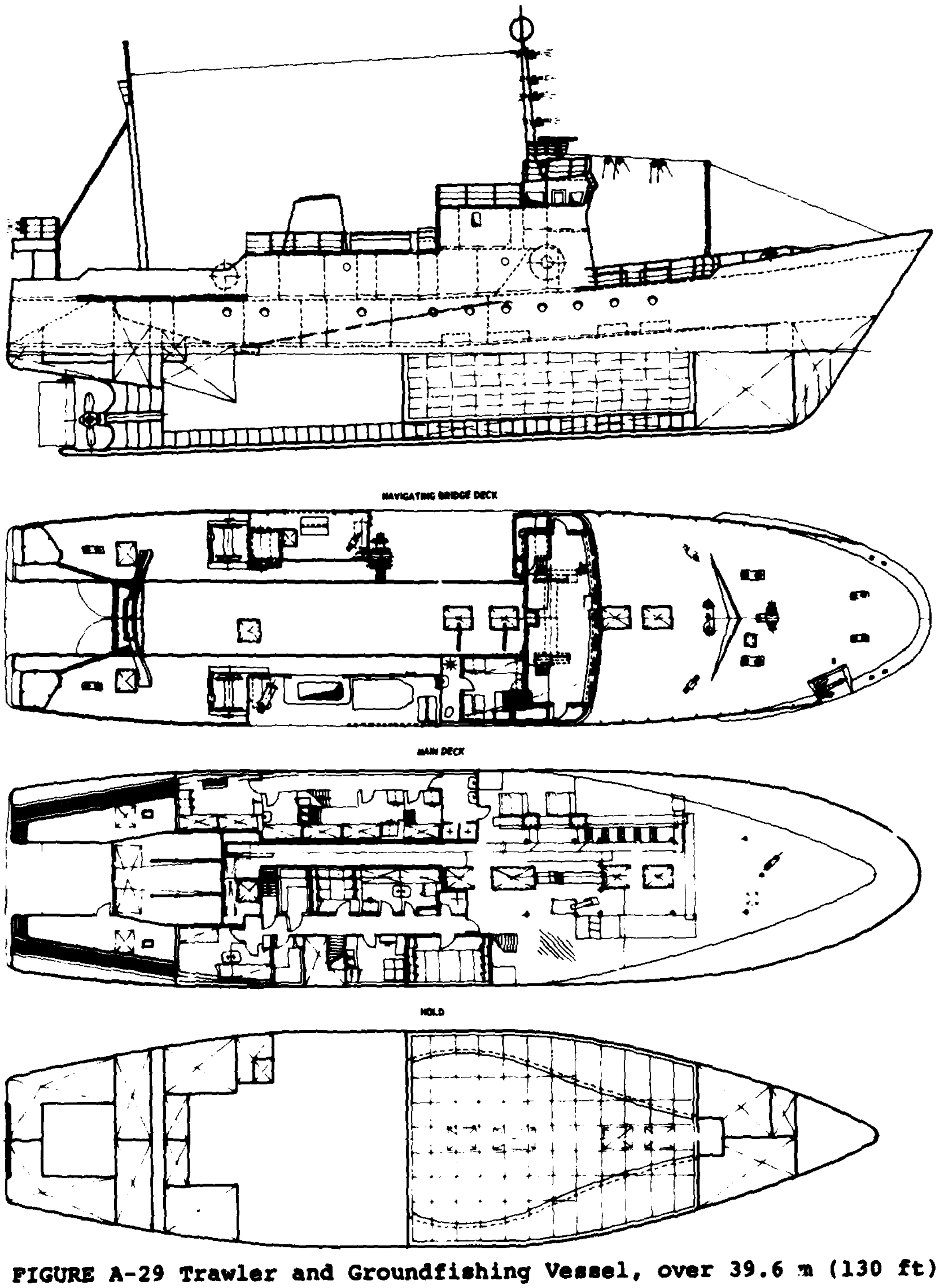

FIGURE A-29 Trawler and Groundfishing Vessel, over 39.6 m (130 ft)

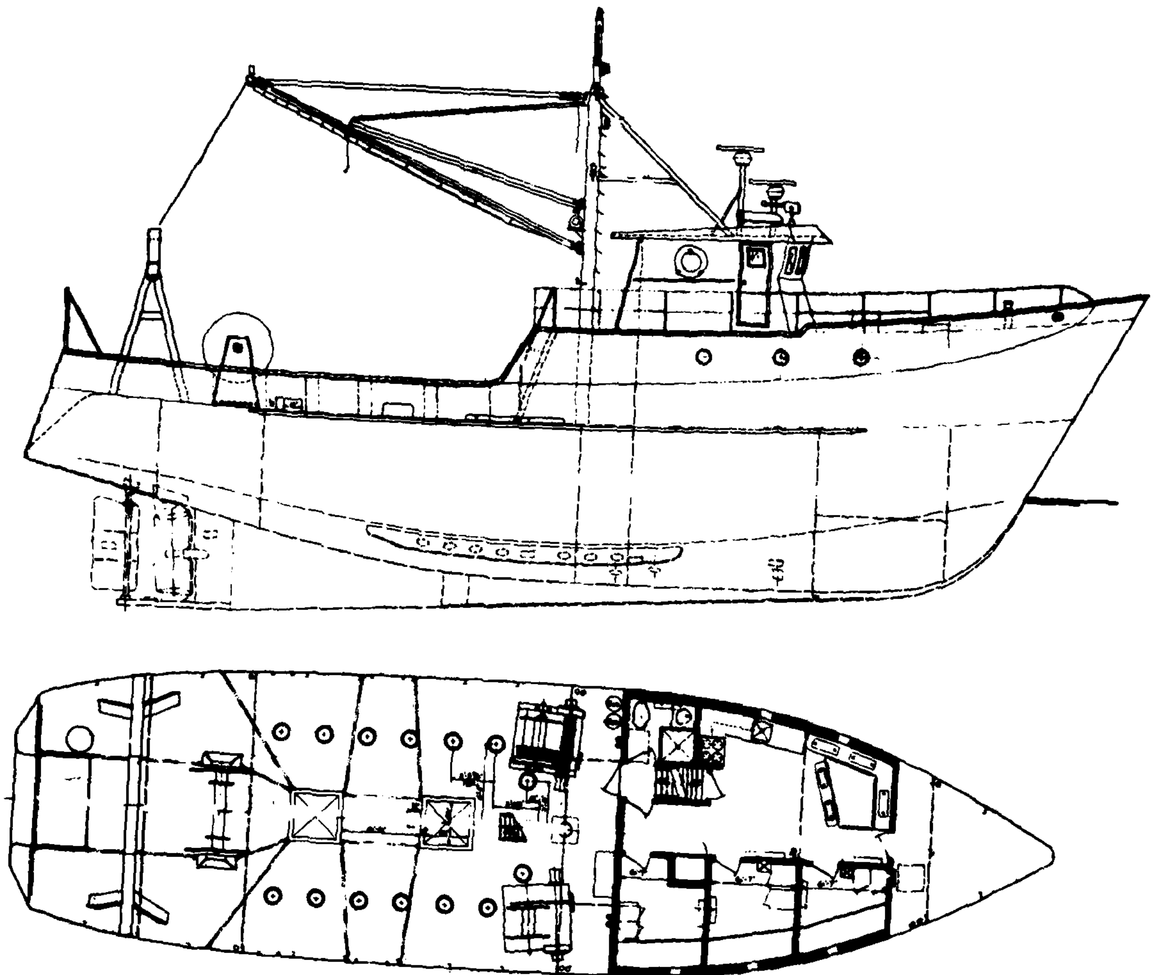

FIGURE A-30 Trawler and Groundfishing Vessel, 23.2-39.3 m (76-129 ft)

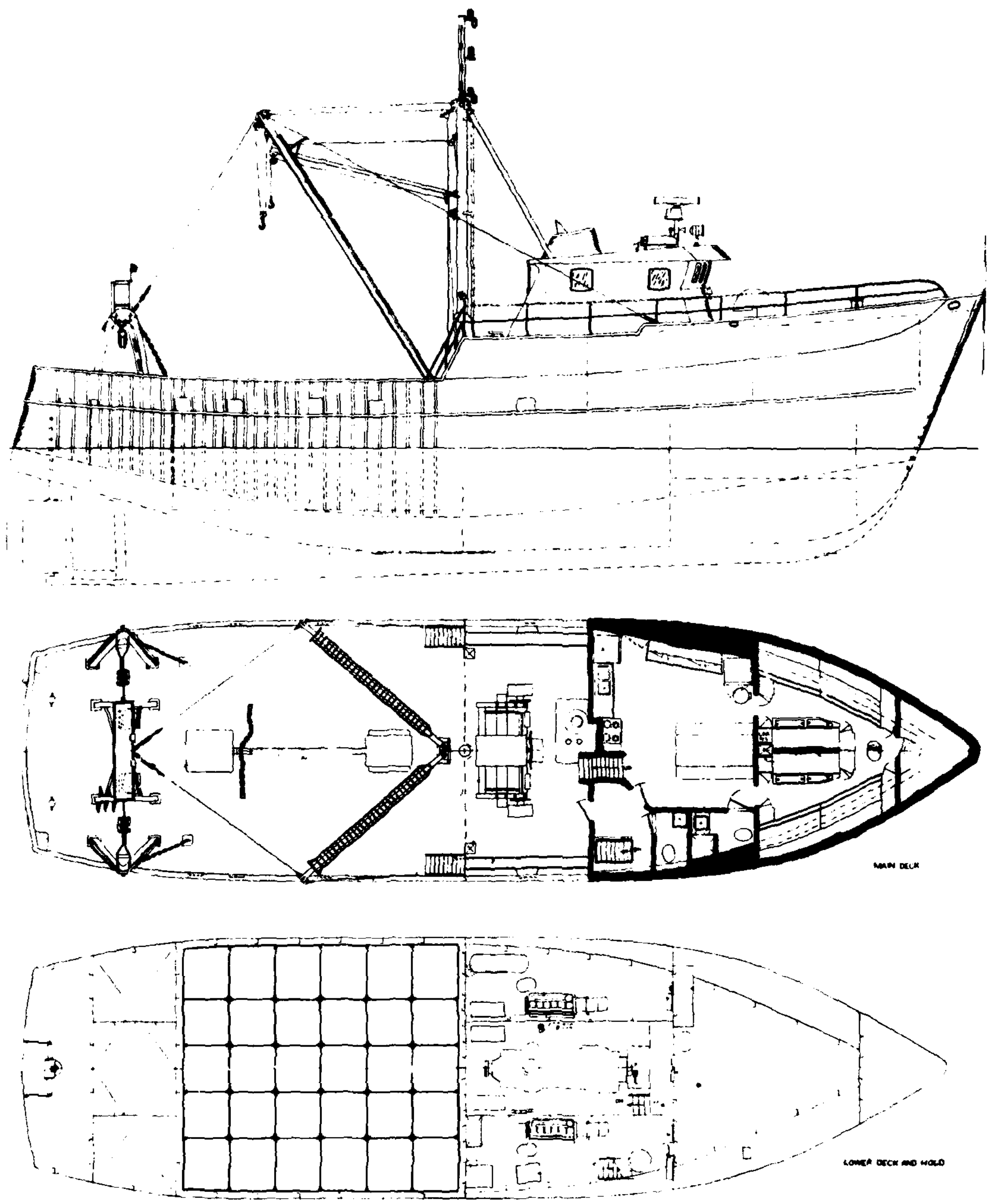

FIGURE A-31 Scallop Boat

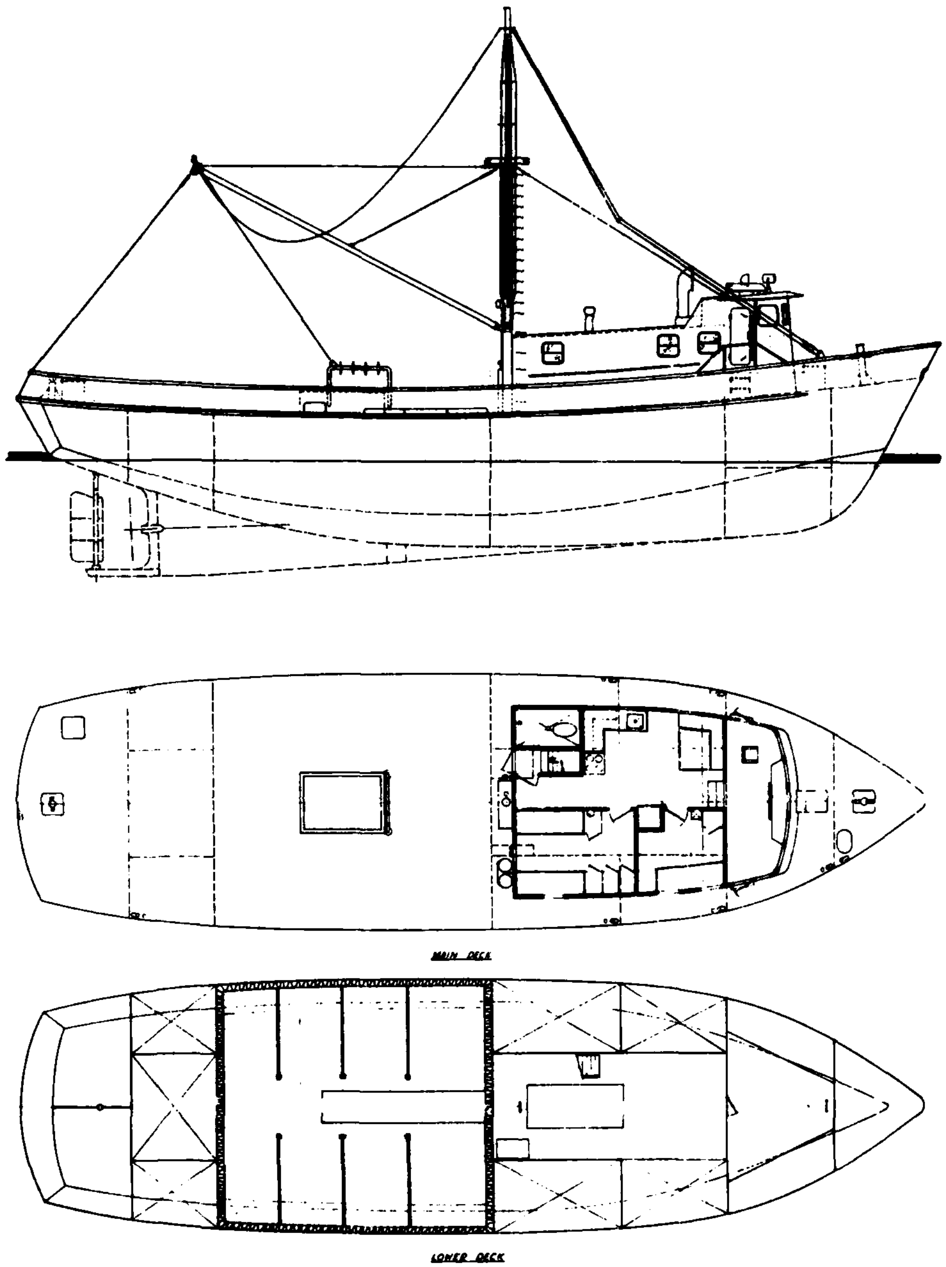

FIGURE A-32 Shrimp Boat, 25.0-29.0 m (82-95 ft)

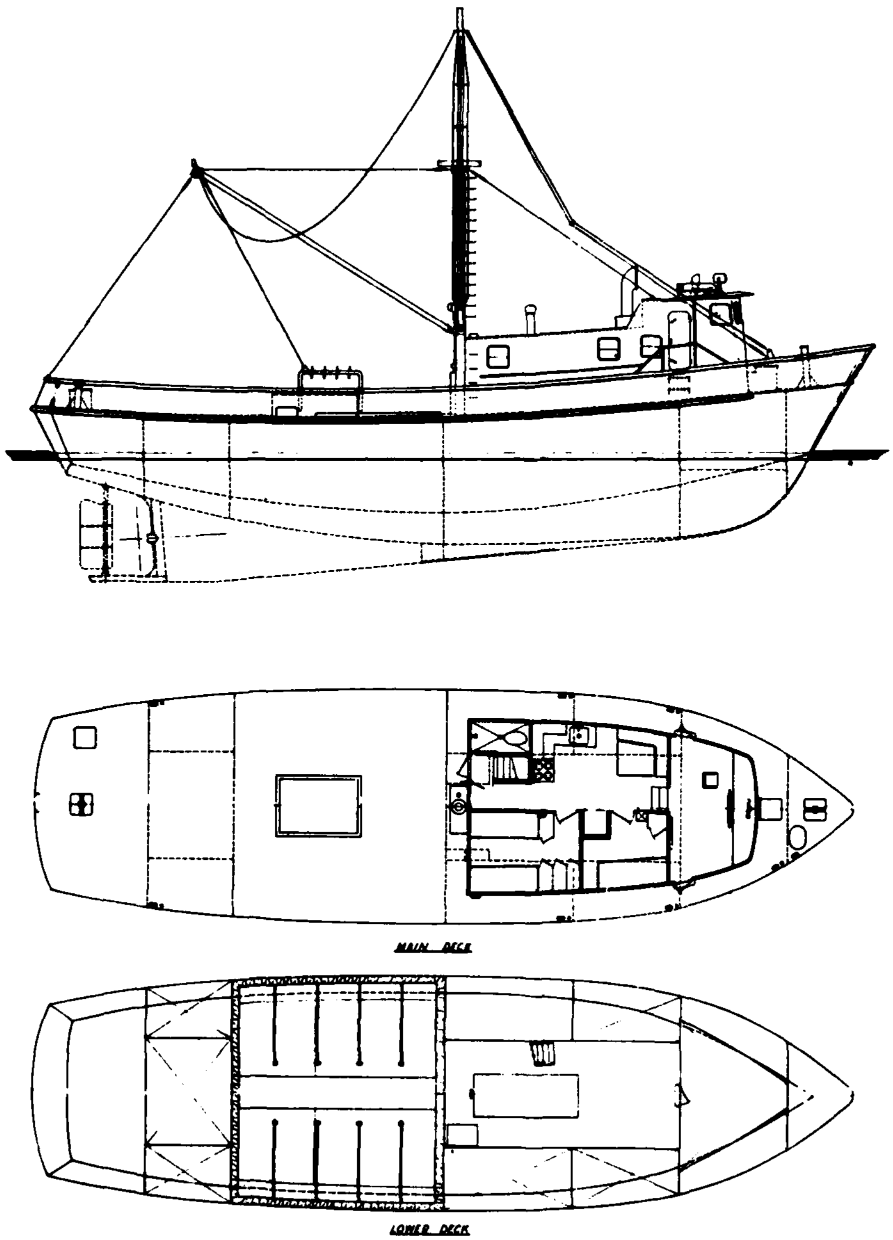

FIGURE A-33 Shrimp Boat, 21.9-24.7 m (72-81 ft)

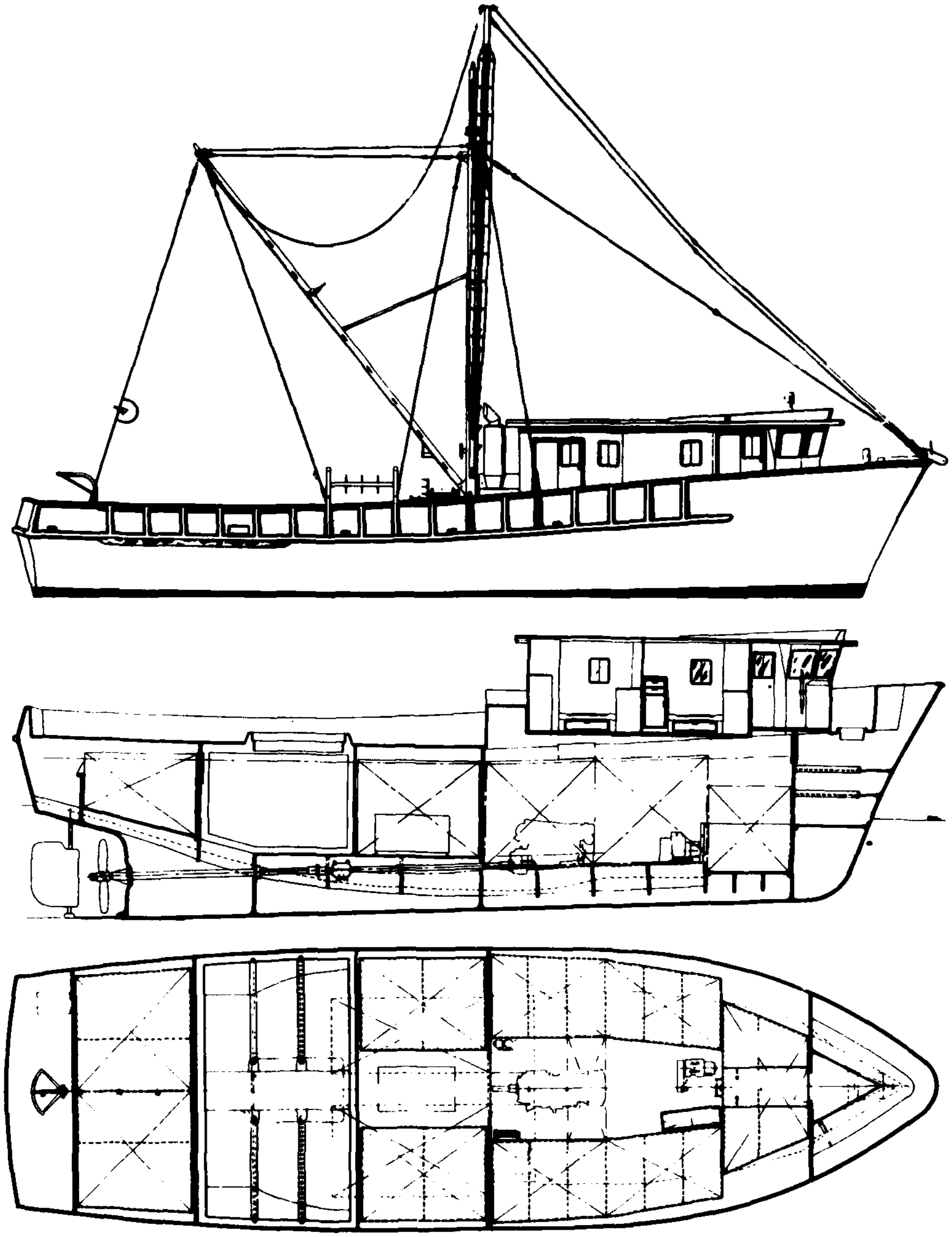

FIGURE A-34 Shrimp Boat, 19.8-21.6 m (65-71 ft)

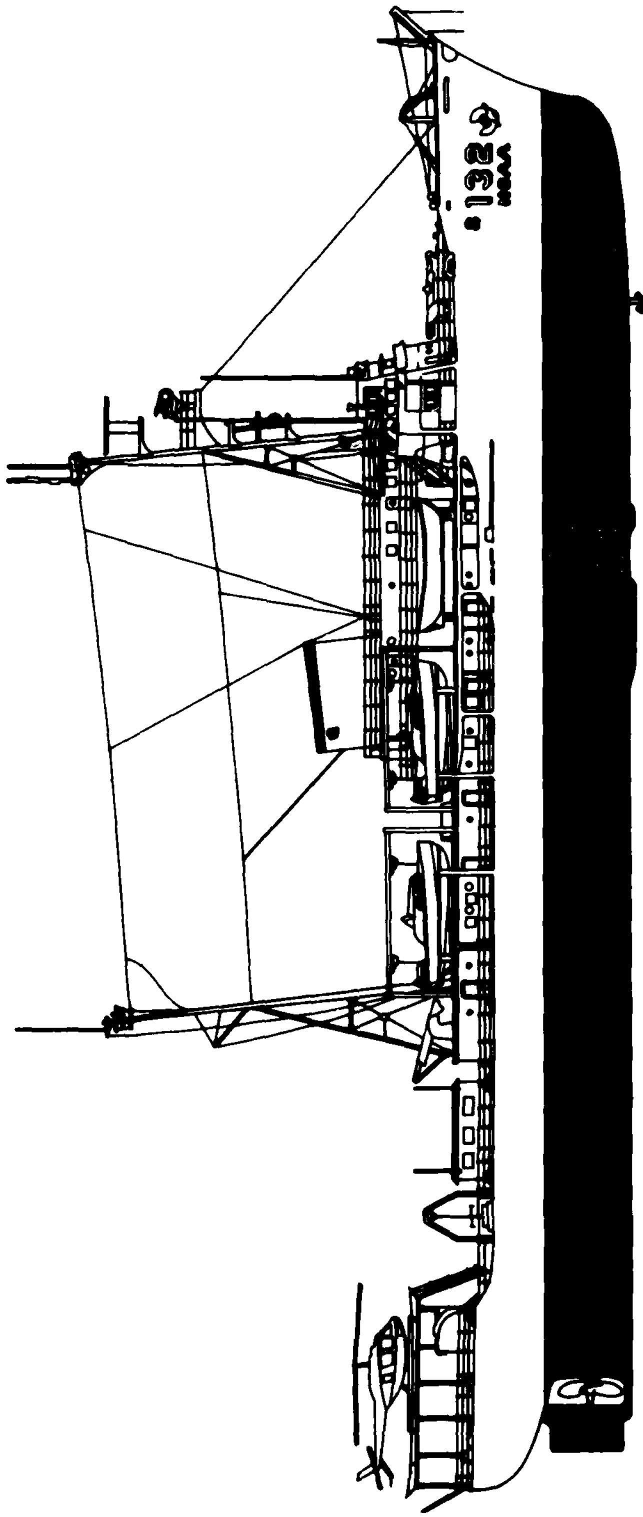

FIGURE A-35 Oceanographic Research Ship, 84.7-92.4 m (278-303 ft)

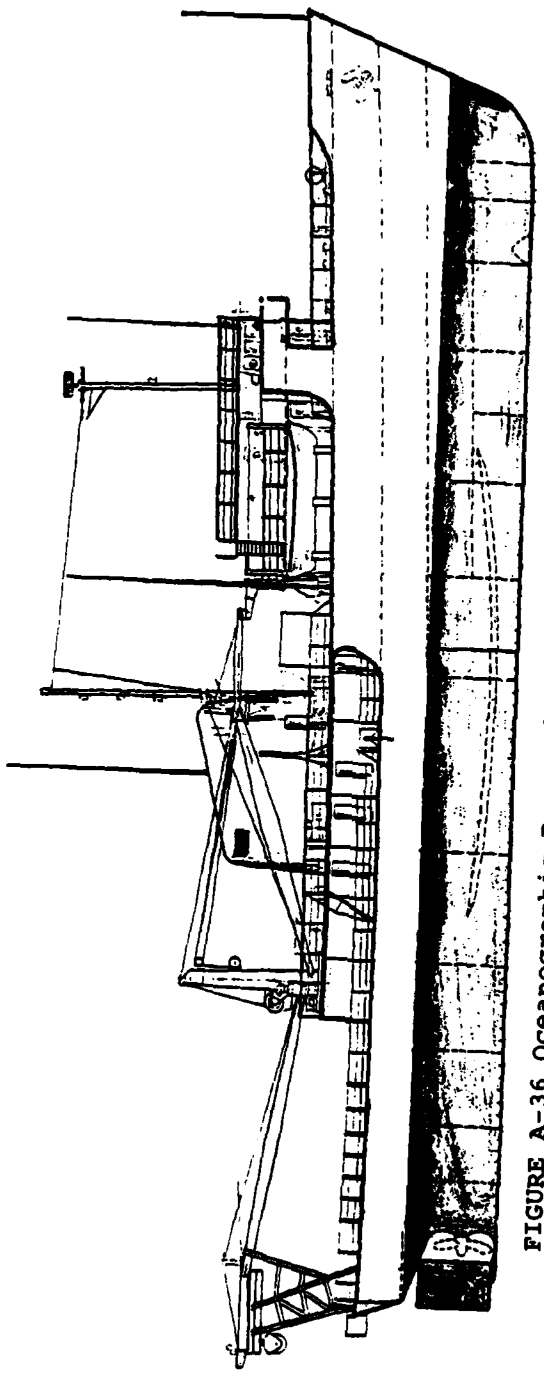

FIGURE A-36 Oceanographic Research Ship, 63.4-74.7 m (208-245 ft)

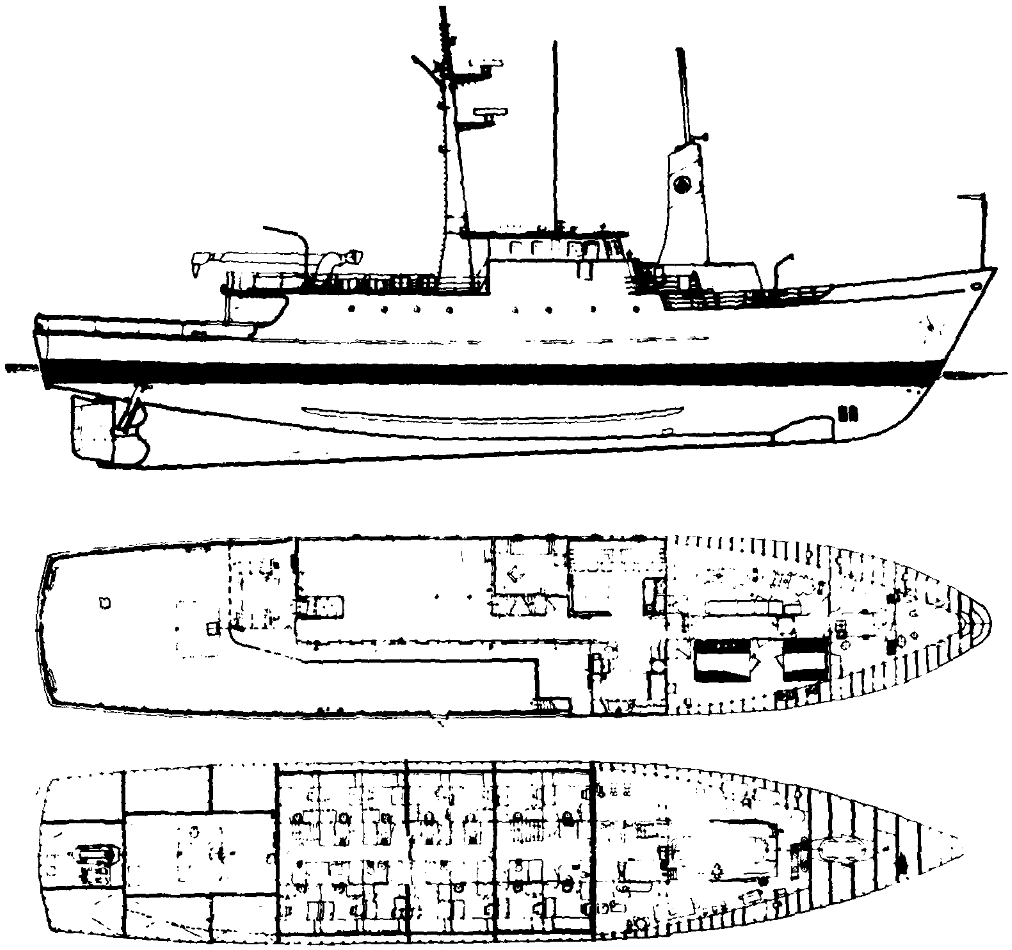

FIGURE A-37 Oceanographic Research Ship, 47.5-57.0 m (156-187 ft)

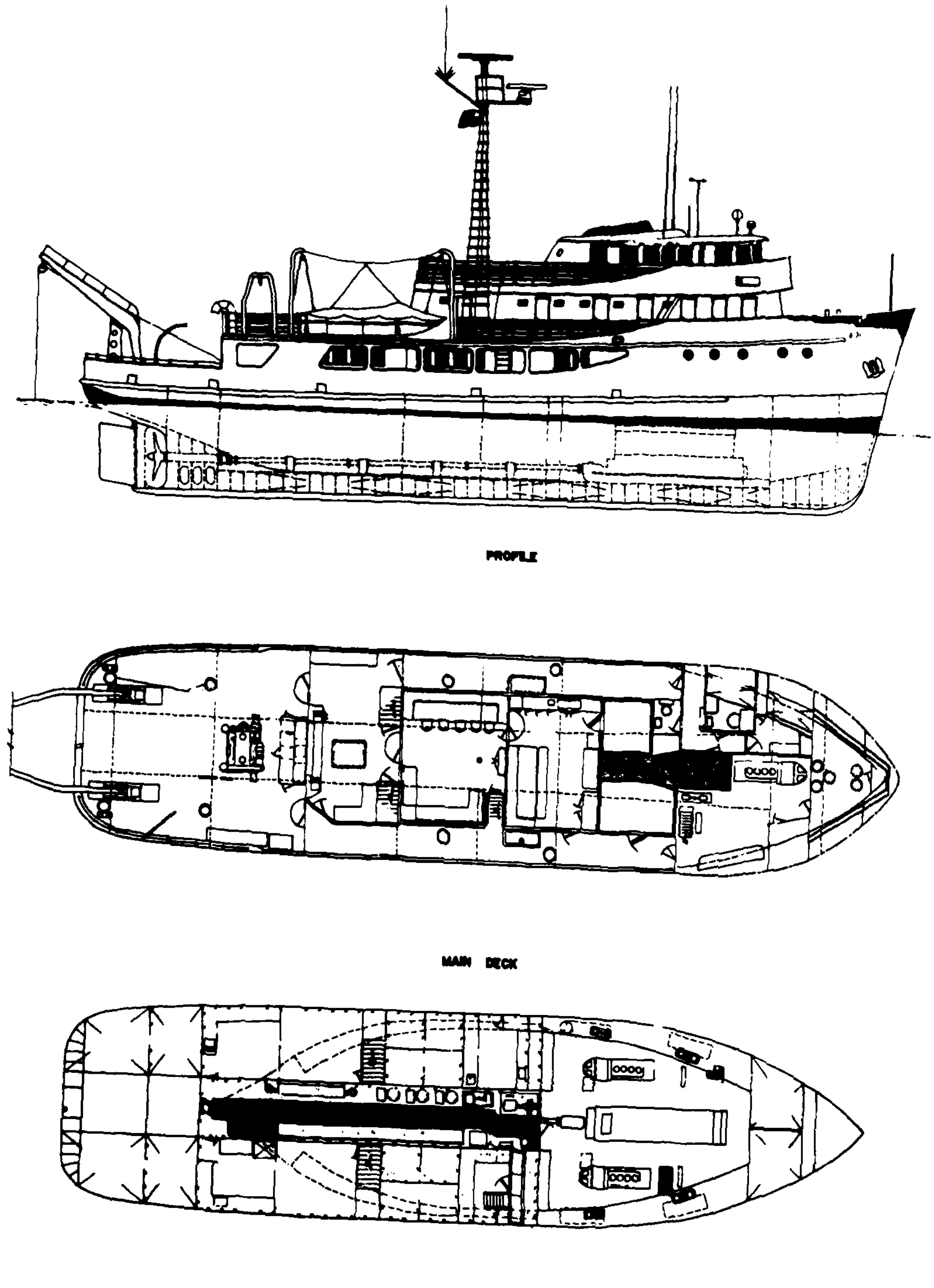

FIGURE A-38 Oceanographic Research Boat, 30.5-45.4 m (100-149 ft)

FIGURE A-39 Oceanographic Research Boat, 19.8-30.2 m (65-99 ft)

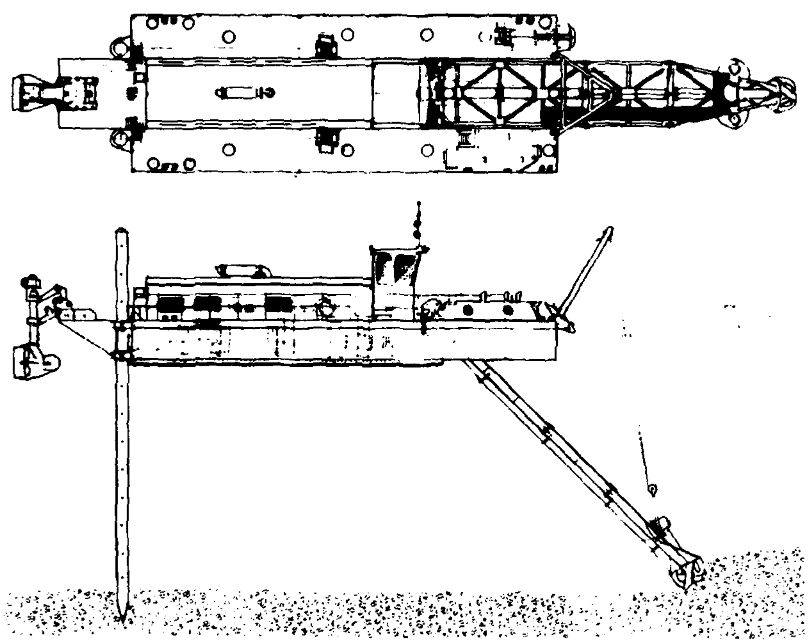

FIGURE A-40 Cutter Suction Dredge

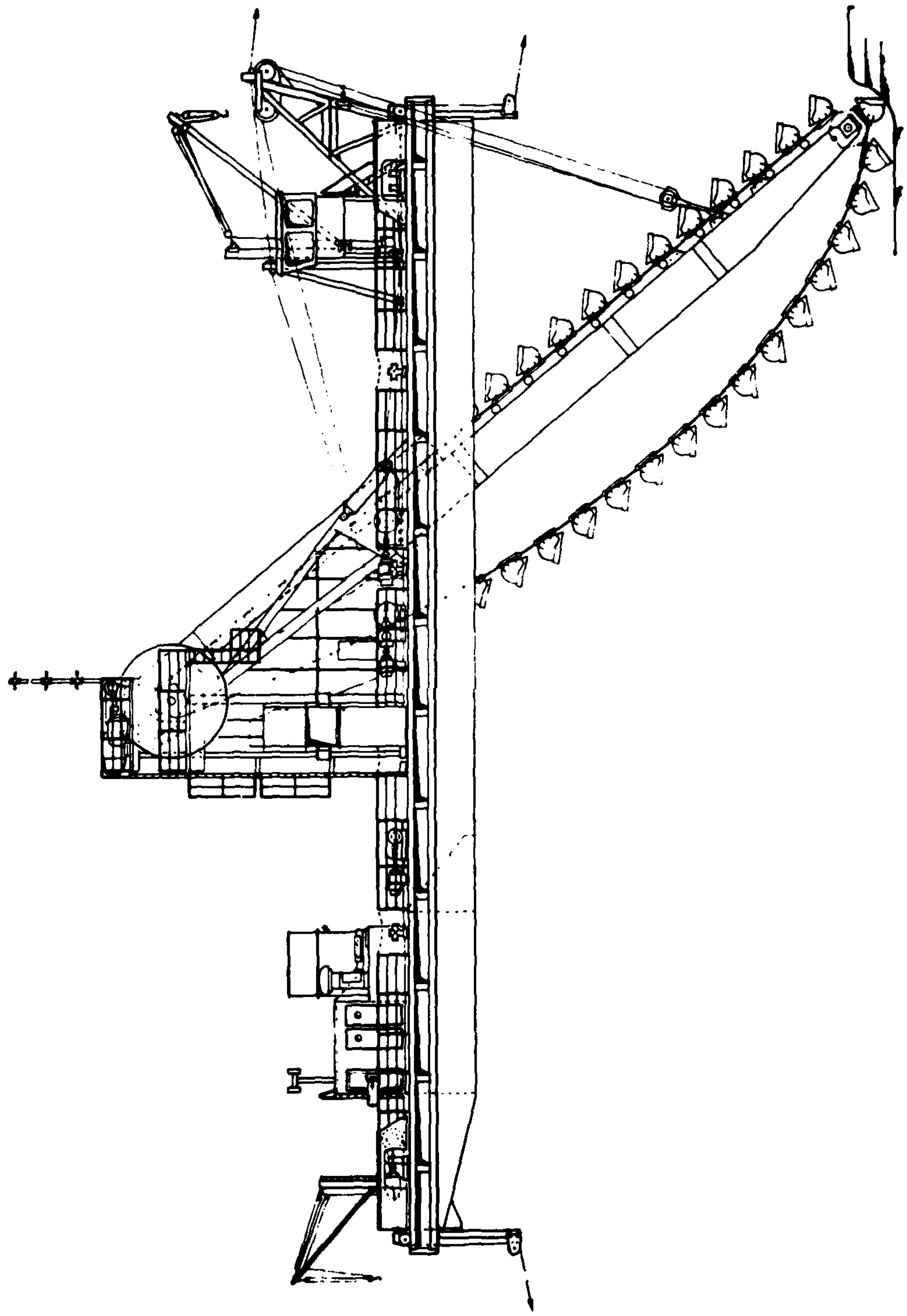

FIGURE A-41 Bucket Ladder Dredge

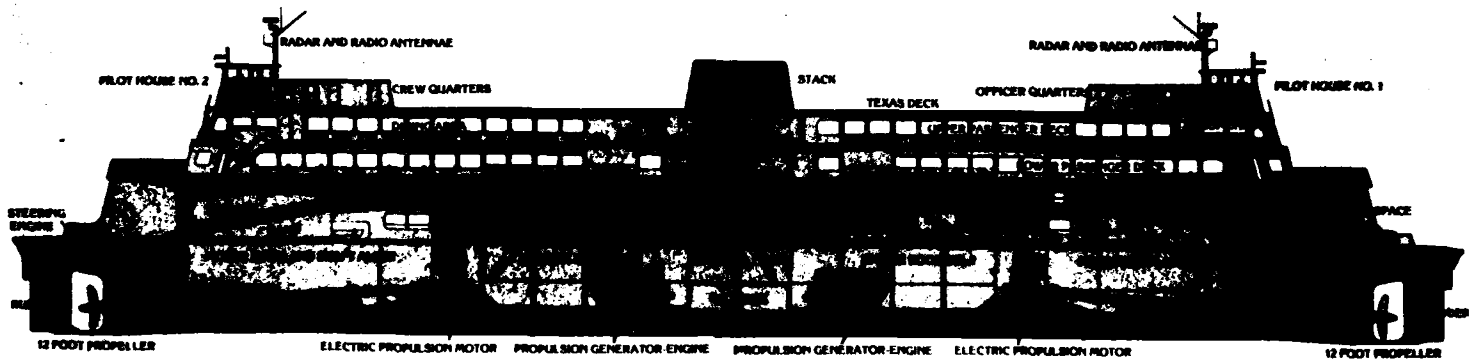

FIGURE A-42 Passenger-Vehicle Ferry

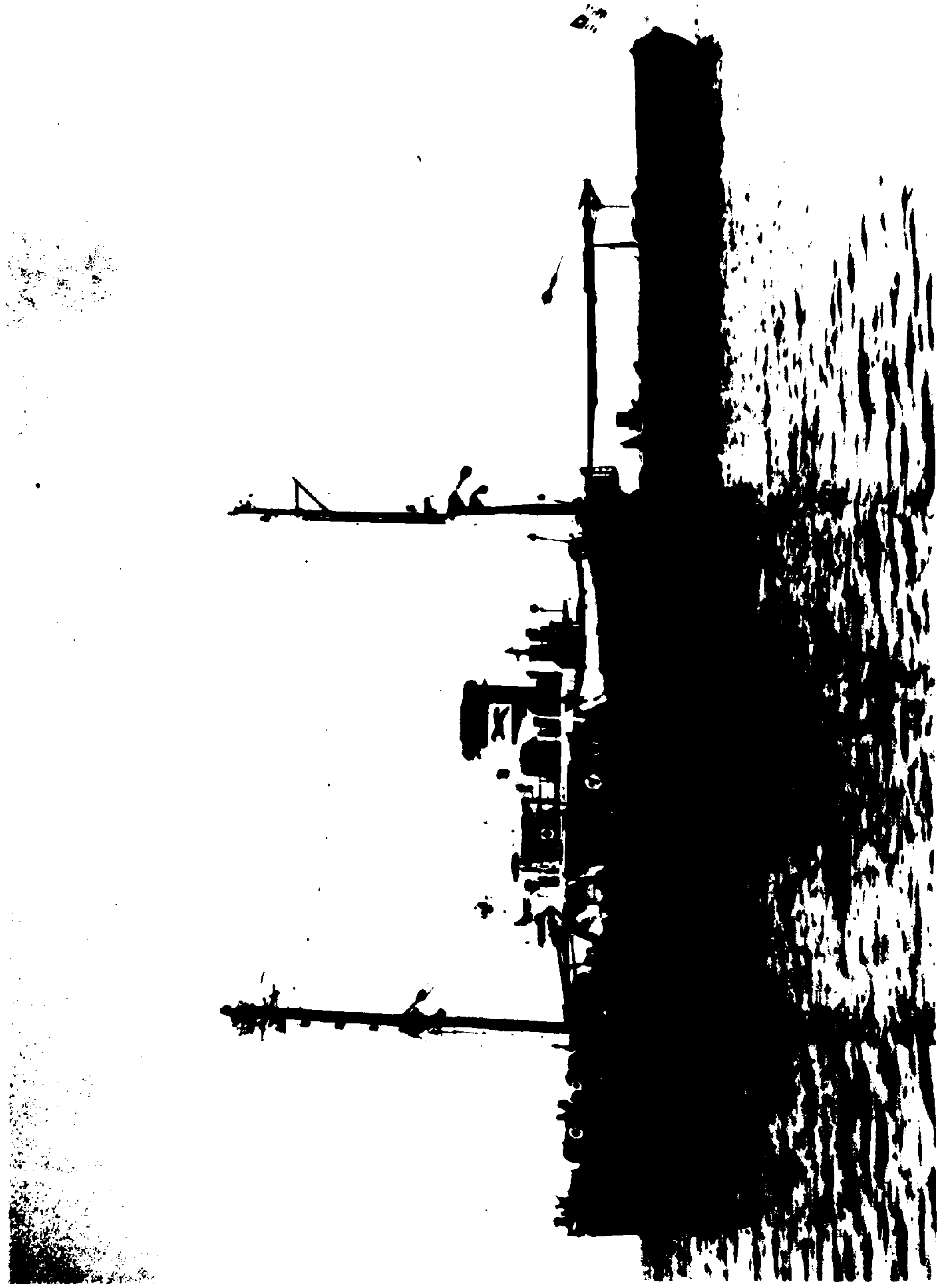

FIGURE A-43 Salvage Vessel

APPENDIX B

VESSEL OWNERS, OPERATORS, AND ASSOCIATIONS

1. <u>OCEAN-CLASSED TUGS</u>

The following are major owner-operators of U.S.-flag ocean-classed tugs of 2,237 kW (3,000 bhp) or more, and built since 1968 (see Table 6-3).

AMERICAN OFFSHORE FLEET, INC., P.O. Box 8, Galliano, LA 70354
(504) 525-5389 or 798-7411; TWX: 810-950-5872
OTTO CANDIES, INC., P.O. Box 25, Des Allemands, LA 70030
(504) 722-1311
CROWLEY MARITIME CORP., One Market Plaza, San Francisco, CA 94105
(415) 546-2300; TLX: 32-1229
DeFELICE MARINE CONTRACTOR, INC., P.O. Box 185, Metairie, LA 70004
(504) 837-3635
DILLINGHAM TUG AND BARGE CO., LTD., P.O. Box 3288, Honolulu, HI 96801
(808) 946-0771
F & S BOAT CO., P.O. Box 264, Berwick, LA 70342
(504) 385-0180; TLX: 58-6309
FOSS LAUNCH AND TUG CO., 660 W. Ewing St., Seattle, WA 98119
(206) 285-0150; TLX: 32-0132

(<u>Note</u>: Both DILLINGHAM TUG AND BARGE CO. and FOSS LAUNCH AND TUG CO. are affiliated companies of DILLINGHAM CORP., Box 3468, Honolulu, HI 96801; (808) 946-0771.)

GULF MISSISSIPPI MARINE CORP., 225 Baronne St., Suite 600, New Orleans, LA 70112
(504) 581-4853; TLX: 161-758
INTERSTATE AND OCEAN TRANSPORT CO., Three Parkway, Philadelphia, PA 19102
(215) 864-1200
JACKSON MARINE CORP., P.O. Box 1087, Aransas Pass, TX 78336
(512) 758-3295 or -3283; TLX: 778-435
McALLISTER BROTHERS, INC., 17 Battery Place, New York, NY 10004
(212) 269-3200
MORAN TOWING & TRANSPORTATION CO., INC., One World Trade Center, Suite 5335, New York, NY 10048
(212) 466-3600; TWX: 710-581-2329
NEWPARK MARINE SERVICES, INC., 908 Front St., P.O. Box 976, Morgan City, LA 70380
(504) 385-0180; TLX: 58-6309; TWX: 810-950-5730
PACIFIC TOWBOAT & SALVAGE CO., Pier D, Berth 35, Long Beach, CA 90802
(213) 432-6487; TLX: 65-6339
ROBIN BOAT RENTAL SERVICE, INC., P.O. Box 526, Harvey, LA 70058
(504) 368-7215 or 369-7217; TWX: 58-7396
(Reportedly acquired by AMERICAN OFFSHORE FLEET, listed above.)
NOLTY J. THERIOT, INC., P.O. Box 306, Golden Meadow, LA 70357
(504) 475-5811; TLX: 58-4146 or 58-7356
TIDEWATER MARINE SERVICE, INC., 1440 Canal St., Suite 2100, New Orleans, LA 70112
(504) 568-1010; TLX: 48-4216

2. OCEAN-CLASSED BARGES

A) TRANSPORT BARGES

The following are major owner-operators of U.S.-flag ocean-classed transport barges of 2,000 grt or more. Included are owner-operators of tank barges (see Table 6-6) and/or general transport barges (see Table 6-7). The latter category includes deck cargo barges, RORO barges, covered house barges, rail barges, and other types. Some transport barges are multi-qualified to carry, e.g., both deck cargo and covered cargo, or both deck cargo and petroleum products.

The addresses of those companies marked with an asterisk (*) are listed above, under "Ocean-Classed Tugs."

ALLIED TOWING CORP., P.O. Box 717, Norfolk, VA 23501
(804) 545-7301; TWX: 710-881-1238
BOUCHARD TRANSPORTATION CO., INC., 25 W. Barclay Street, Hicksville Plaza, Hicksville, Long Island, NY 11801
(516) 681-4900
BROWN & ROOT, INC., P.O. Box 3, Houston, TX 77001
(713) 676-3011 or 676-3883
*OTTO CANDIES, INC.
*CROWLEY MARITIME CORP.
*DILLINGHAM TUG AND BARGE CO.
*FOSS LAUNCH AND TUG CO.
*GULF MISSISSIPPI MARINE CORP.
*INTERSTATE AND OCEAN TRANSPORT CO.
J. RAY McDERMOTT & CO., INC., P.O. Drawer 38, Harvey, LA 70058
(504) 366-8111
[or: J. RAY McDERMOTT & CO., INC., Equipment & Machinery Group, P.O. Box 60035, New Orleans, LA 70160; (504) 587-5400; TLX: 58-6394]
*MORAN TOWING & TRANSPORTATION CO., INC.

(Note: includes MORANIA OIL TANKER CORP., a Moran affiliate; and SEABOARD SHIPPING CO., a division of Moran.)

READING & BATES OFFSHORE DRILLING CO., 3800 First Place, Tulsa, OK 74103
(918) 583-8521
SANTA FE-POMEROY MARINE SERVICE, 500 Hopper St., Petaluma, CA 94952
(707) 763-1918
[Subsidiary of SANTA FE INTERNATIONAL CORP., 505 South Main St., P.O. Box 1401, Orange, CA 92668; (714) 558-1300; TLX: 685-525]
SHERIDAN TRANSPORTATION CO., 12 South 12th St., Philadelphia, PA 19107
(512) 925-0451
STEUART TRANSPORTATION CO., Star Route, Box 227, Piney Point, MD 20674
(301) 994-2222 or (202) 638-6848
TEXACO, INC., P.O. Box 1028, Port Arthur, TX 77640
[Headquarters: Texaco, Inc., 2000 Westchester Ave., White Plains, NY 10650; (914) 253-4000]

TIDEWATER BARGE LINES, 6 Beach Drive, Vancouver, WA 98661
(206) 693-1491
ZIDELL, INC., 3121 S.W. Moody Ave., Portland, OR 97201
(503) 228-8691

B) CRANE AND DERRICK BARGES

The following are major operators of U.S.-flag crane or derrick barges with lifting capacity of 100 tons or more. The addresses of companies marked with an asterisk (*) are listed above, under "Ocean-Classed Tugs;" those marked with a cross (+), under "Transport Barges."

BISSO MARINE CO., INC., 2228 Broadway, P.O. Box 4113, New Orleans, LA 70178
(504) 861-7549 or 861-9152
+BROWN & ROOT, INC.
*CROWLEY MARITIME CORP.
GATES CONSTRUCTION CORP., 208 Gates Road, Little Ferry, NJ 07643
(201) 342-4660
+J. RAY McDERMOTT & CO., INC.
OCEANEERING, 414 East Cota, Santa Barbara, CA 93101
RAYMOND INTERNATIONAL, INC., 2801 South Post Oak Road, P.O. Box 22718, Houston, TX 77027
+SANTA FE-POMEROY MARINE SERVICE
SMITH-RICE CO., 2199 Clement Ave., Alameda, CA 94501
(415) 523-5925
TELEDYNE MOVIBLE OFFSHORE, INC., P.O. Box 51936, OCS, Lafayette, LA 70505
(318) 232-5120
WILLIAMS-McWILLIAMS CO., P.O. Box 52677, New Orleans, LA 70152
(504) 837-1030

C) SPECIALIZED BARGES

The following are some of the major owner-operators of U.S.-flag specialized barges of 2,000 grt or more (see Table 6-10). Included are owner-operators of drilling platform barges and drilling tender barges (D), and pipe-laying and pipe-burying barges (P). (Note that launch barges and drilling barges are owned or operated by all major offshore developers, many of whom are not listed here.) The addresses of companies marked with a cross (+) are listed above, under "Transport Barges."

ATWOOD OCEANICS, INC., P.O. Box 19147, Town and Country Office Park, Suite 301, 10555 Katy Freeway, Houston, TX 77020 (D)
(713) 467-7900
BRINKERHOFF DRILLING CO., INC., 600 Denver Club Bldg., Denver, CO 80202 (D)
(303) 571-1041; TLX: 454-470
+BROWN & ROOT, INC. (P)
+J. RAY McDERMOTT & CO., INC. (P)

PENROD DRILLING CO., P.O. Box 52268, OCS, Lafayette, LA 70505 (D)
(318) 232-7032
+READING & BATES OFFSHORE DRILLING CO. (D)
ROWAN INTERNATIONAL, INC., 1900 Post Oak Road, 5501 Westheimer, Houston, TX 77027 (D)
(713) 621-7800
+SANTA FE-POMEROY MARINE SERVICE (P)

D) POWER-GENERATING BARGES

Six U.S.-flag ocean-classed generating barges are owned and operated by:

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC., 4 Irving Place, New York, NY 10003
(212) 460-4600

3. INTEGRATED TUG-BARGE SYSTEMS

The following are owner-operators of one or more U.S.-flag ocean-classed ITB systems.

BARGE TRAIN, INC., 555 East Ocean Blvd., Suite 515, Long Beach, CA 90802
(213) 436-0218
COORDINATED CARIBBEAN TRANSPORT, INC., 1001 North American Way, Miami, FL 33132
(305) 358-7960 or 665-9292
GULFCOAST TRANSIT CO., 4251 Henderson Blvd., Tampa, FL 33609
(813) 876-4161; TWX: 810-876-0687
INGRAM OCEAN SYSTEMS, INC., 4100 One Shell Square, New Orleans, LA 70139
(504) 588-2665 or 588-2400
SEABULK CORP., INC., Hvide Shipping, Inc., P.O. Box 13038, Port Everglades Station, 1900 S.E. 17th St., Fort Lauderdale, FL 33316
(305) 527-1712; TLX: 51-4315

4. OFFSHORE SERVICE AND SUPPLY VESSELS

The following are major U.S. owner-operators of offshore service and supply vessels (see Table 7-1). The addresses of companies marked with an asterisk (*) are listed above, under "Ocean-Classed Tugs."

*OTTO CANDIES, INC.
EURO PIRATES INTERNATIONAL, INC., One Shell Square, Suite 4324, New Orleans, LA 70139
(504) 581-5701
JOE E. GRAHAM & SONS, P.O. Box 877, Bayou La Batre, AL 36509
*GULF MISSISSIPPI MARINE CORP.
*JACKSON MARINE CORP.
OFFSHORE LOGISTICS, INC., P.O. Box 5-C, Lafayette, LA 70501
(318) 233-1221
PETROL MARINE CO., P.O. Box 2116, Houma, LA 70361
(504) 868-2450

SEAHORSE, INC., 201 Everett St., P.O. Drawer 968, Morgan City, LA 70380
(504) 821-5840 or 385-0900; TLX: 58-6347
STATE BOAT CORP., 3701 Kirby Drive, Houston, TX 77098 (or P.O. Box 543, Houston, TX 77006)
(713) 528-5359; TLX: 77-5125 (New Orleans: (504) 395-2838)
*TIDEWATER MARINE SERVICE, INC.
ZAPATA MARINE SERVICE, INC., 3000 Zapata Tower, Houston, TX 77002 (or P.O. Box 4240, Houston, TX 77001)
(713) 226-6000

Information on member companies' fleets and operations can be obtained from the Offshore Marine Service Association, an association of Gulf Coast marine service operators. In 1979, OMSA had over 200 members, with 92 companies (including all but one of the above) listed in the "full membership" category. Contact:

William A. Mayberry, Executive Director, OFFSHORE MARINE SERVICE ASSOCIATION, International Trade Mart, 2 Canal St., Suite 2939, New Orleans, LA 70130
(504) 523-7363

5. DRILLSHIPS AND SEMISUBMERSIBLES

The following are owner-operators of U.S.-flag drillships (DS) and semisubmersibles (SS). (See Tables 7-2 and 7-4, respectively.)

ASSOCIATED MARINE SERVICES, INC., 3825 Stoneway North, Seattle, WA 98103 (DS)
(206) 624-4122
ATWOOD OCEANICS, INC., Town and County Office Park, Suite 301, 10565 Katy Freeway, P.O. Box 19147, Houston, TX 77001 (DS, SS)
(713) 467-7900
DIAMOND M CO., 4615 Post Oak Place, Suite 101, P.O. Box 22738, Houston, TX 77027 (SS)
(713) 623-8660; TLX: 762-858
DOLPHIN INTERNATIONAL, S.A., One Allen Center, Suite 2525, Houston, TX 77002 (SS)
(713) 659-5381
EXXON COMPANY, USA, P.O. Box 1512, Houston, TX 77001 (SS)
(713) 656-3636 or 221-3636
FIELD INTERNATIONAL DRILLING CO., 930 Milam Bldg., San Antonio, TX 78205 (SS)
(512) 225-1611
FLUOR DRILLING SERVICES, INC., 1010 De Montluzin Bldg., 234 Loyola Ave., New Orleans, LA 70112 (DS)
(504) 581-5333
GLOBAL MARINE, INC., Global Marine House, 811 W. Seventh St., P.O. Box 54031, Los Angeles, CA 90017 (DS)
(213) 680-9550; TLX: 67-272
GOLDEN LANE DRILLING CO., 1011 Tremont Street, Galveston, TX 77550 (DS)
(713) 763-8528

KEY INTERNATIONAL DRILLING LTD., P.O. Box 910, Coral Gables, FL 33134 (SS)
[or: KEYDRIL CO., One Allen Center, 500 Dallas St., Houston, TX 77002; (713) 750-3112]

MARINE DRILLING & CORING CO., 124 Lancaster S.E., Salem, OR 97301 (DS)

MARLIN DRILLING CO., INC., Park Tower South, 1333 West Loop South, Suite 780, Houston, TX 77027 (SS)
(713) 627-1161

MISSION DRILLING & EXPLORATION CORP., One Shell Square, Suite 3624, New Orleans, LA 70139 (DS)
(504) 834-6603

ODECO, INC. [Ocean Drilling & Exploration Co.], 1600 Canal St., P.O. Box 61780, New Orleans, LA 70161 (DS, SS)
(504) 561-2811; TLX: 58-4124

THE OFFSHORE COMPANY [and International Drilling Co.], 3411 Richmond Ave., P.O. Box 2765, Houston, TX 77001 (DS, SS)
(713) 871-7500

OGDEN MARINE DRILLING, INC., 4615 Post Oak Place Drive, Houston, TX 77027 (DS)

PENROD DRILLING CO., 3333 First National Bank Bldg., Dallas, TX 75202 (SS)
TLX: 73-0430
[or: P.O. Box 52268, OCS, Lafayette, LA 70505; (318) 232-7032]

PROGRESS MARINE INC., 6001 Savoy Drive, Suite 400, Houston, TX 77036 (DS)
(713) 780-9400
[or: P.O. Box 2548, Morgan City, LA 70380; (504) 631-0331]

READING & BATES OFFSHORE DRILLING CO., 3800 First Place, Tulsa, OK 74103 (DS)
(918) 583-8521
[or: 901 Threadneedle, Suite 2000, Houston, TX 77079; (713) 496-5000]

ROWAN INTERNATIONAL, INC., 1900 Post Oak Tower, Houston, TX 77027 (SS)
(713) 621-7800

SANTA FE INTERNATIONAL CORP., 505 South Main St., P.O. Box 1401, Orange, CA 92668 (DS,SS)
(714) 558-1300; TLX: 685-525

SEDCO, INC. [South Eastern Drilling Corp.], Cumberland Hill, 1901 North Akard, Dallas, TX 75201 (DS,SS)
(214) 748-9281

TRANSWORLD DRILLING CO., 113 Robert S. Kerr Ave., P.O. Box 25861, Oklahoma City, OK 73125 (SS)
(405) 236-1313

WESTERN OCEANIC, INC., 2000 West Loop South, Suite 2222, Houston, TX 77027 (SS)
(713) 627-3030

ZAPATA OFF-SHORE CO., Zapata Tower, 711 Louisiana, P.O. Box 4240, Houston, TX 77001 (DS,SS)
(713) 226-6000; TLX: 76-2595; TWX: 910-881-3792

6. TUNA BOATS

Contact with the corporate owners or managing owners of U.S.-flag tuna boats can be made through the following associations, listed in descending order of the numbers of vessels owned by members.

A) Seiners (200-1,600 grt), August Felando, General Manager, AMERICAN TUNABOAT ASSOC., One Tuna Lane, San Diego, CA 92101
(714) 233-6405
B) Baitboats, Jack C. Bowland, General Manager, WESTERN FISHBOAT OWNERS ASSOC., 5055 North Harbor Drive, Suite A, San Diego, CA 92101
(714) 224-2475
C) Seiners (50-200 grt), FISHERMEN'S COOPERATIVE ASSOC., Berth 73, 304 West Harbor St., San Pedro, CA 90732
(213) 832-5377

7. MENHADEN VESSELS

The following are major owner-operators of U.S.-flag Gulf Coast menhaden vessels (see Table 8-2).

NEW SMITH MEAL CO., INC., 294 Washington St., Boston, MA 02121
PETROV FISHERIES, INC., P.O. Box 128, Empire, LA 70050
SEA COAST PRODUCTS, INC., P.O. Box 369, Abbeville, LA 70510
STANDARD PRODUCTS CO., INC., P.O. Box 646, Moss Point, MS 39563
Vice President, Marine Products, ZAPATA CORP., Zapata Tower, 711 Louisiana, P.O. Box 4240, Houston, TX 77001
(713) 226-6000; TLX: 76-2595; TWX: 910-881-3792

Owner-operators of U.S.-flag menhaden vessels in the Atlantic sector can be identified by contacting the following.

Thomas E. Reynolds, Director, NATIONAL FISH MEAL AND OIL ASSOC., 1100 - 17th St., N.W., Suite 411, Washington, D.C. 20036
(202) 785-0227
Robert B. Chapoton, Leader, Menhaden Resource Monitoring and Management Task Group, Beaufort Laboratory, NATIONAL MARINE FISHERIES SERVICE, National Oceanic and Atmospheric Administration, Beaufort, NC 28516
(919) 728-4595

8. KING CRAB VESSELS

Contact with owner-operators of U.S.-flag king crab vessels (and related Pacific Northwest-Alaska fisheries) can be made through the following major associations.

Sig Jaeger, General Manager, NORTH PACIFIC FISHING VESSEL OWNERS ASSOC., Fishermen's Terminal, Bldg. C-3, Room 133, Seattle, WA 98119
(206) 285-3383
UNITED FISHERMEN OF ALASKA, P.O. Box 1352, Juneau, AK 99802
(907) 586-2820

The United Fishermen of Alaska is itself an association of the 17 organizations listed below. (It should be noted that (a) many king crab vessels also fish for salmon during the off-season and (b) some UFA member organizations include few or no king crab vessels.)

ALASKA INDEPENDENT FISHERMEN'S MARKETING ASSOC., 6333 Sugar Maple St., S.E., Olympia, WA 98503
ALASKA TROLLERS ASSOC., P.O. Box 5825, Ketchikan, AK 99901
CENTRAL COUNCIL: TLINGIT HAIDA INDIANS OF ALASKA, 1 Sealaska Plaza, Suite 200, Juneau, AK 99801
CHIGNIK BOAT OWNERS ASSOC., Chignik Lagoon, Chignik, AK 99564
COMMERCIAL FISHERMEN OF COOK'S INLET, P.O. Box 2641, Kenai, AK 99611
COMMERCIAL FISHERMEN'S CO-OP ASSOC., 702 Water Street, Ketchikan, AK 99901
COOK INLET FISHERMEN'S ASSOC., SRA Box 48-T, Anchorage, AK 99507
COOK INLET FISHERMEN'S FUND, P.O. Box 3, Ninilchik, AK 99639
CORDOVA DISTRICT FISHERIES UNION, P.O. Box 939, Cordova, AK 99574
HALIBUT PRODUCERS COOPERATIVE, P.O. Box 1235, Bellingham, WA 98225
KENAI PENINSULA FISHERMEN'S COOPERATIVE ASSOC., Route 2, Box 752, Soldotna, AK 99669
NORTH PACIFIC FISHERIES ASSOC., P.O. Box 796, Homer, AK 99603
PETERSBURG VESSEL OWNERS ASSOC., P.O. Box 232, Petersburg, AK 99833
PURSE SEINE VESSEL OWNERS ASSOC., P.O. Box 5106, Seattle, WA 98107
PENINSULA MARKETING ASSOC., P.O. Box 32, Sand Point, AK 99661
SOUTHEAST ALASKA SEINE BOAT OWNERS AND OPERATORS ASSOC., 728 Water Street, Ketchikan, AK 99901
SOUTHEAST GILLNET FEDERATION, P.O. Box 1066, Juneau, AK 99802

Other non-UFA associations include the following.

Harold Lokken, Manager, FISHING VESSEL OWNERS ASSOC., Fishermen's Terminal, Bldg. C-3, Room 232, Seattle, WA 98119
(206) 284-4720
SHRIMP TRAWLERS ASSOC., P.O. Box 991, Kodiak, AK 99615
YAKUTAT FISHERMEN'S CO-OP, P.O. Box 343, Yakutat, AK 99689
UNITED FISHERMEN'S MARKETING ASSOC., P.O. Box 105, Kodiak, AK 99615

9. TRAWLERS AND GROUNDFISHING VESSELS

This sector is characterized by a large number of local and regional associations. Contact with owner-operators of about 350-400 U.S.-flag trawlers and groundfishing vessels can be made through four associations, listed below in descending order of numbers of vessels operating from each area.

Richard Korb, Industrial Coordinator, Economic Resources Center, GLOUCESTER FISHERIES ASSOC., INC., P.O. Box 539, Gloucester, MA 01930
Octavio Modesto, General Manager, SEAFOOD PRODUCERS OF NEW BEDFORD, 60 North Water St., New Bedford, MA 02740
(617) 999-5258

Jacob Dykstra, President, POINT JUDITH FISHERMEN'S CO-OP. ASSOC., INC., Galilee Road, P.O. Box 730, Narragansett, RI 02882
(401) 783-3368
Hugh O'Rourke, Executive Secretary, BOSTON FISHERIES ASSOC., INC., 253 Northern Ave., Room 205, Fish Pier, Boston, MA 02210

10. <u>SHRIMP BOATS</u>

Although shrimping takes place off all coasts, the major U.S.-flag fleets of shrimp boats are concentrated on the Texas, Louisiana, and Florida coasts. Contacts with major operators can be made through the following associations.

William Utz, Executive Director, NATIONAL SHRIMP CONGRESS, 1320 - 19th St., N.W., 4th Floor, Washington, D.C. 20036
(202) 785-2130
Ralph Rayburn, Executive Director, TEXAS SHRIMP ASSOC., 403 Vaughn Bldg., Austin, TX 78701
(512) 476-8446/-8447
Robert Jones, Executive Secretary, SOUTHEASTERN FISHERIES ASSOC., 124 West Jefferson St., Tallahassee, FL 32301

Major Gulf Coast shrimp boat operators include the following, listed in descending order of estimated fleet size (shown in parentheses).

Jack Sahlman, SAHLMAN SEAFOODS, 1352 Sahlman Ave., Tampa, FL 33605 (100)
(813) 248-5726
Sydney Herndon, HERNDON MARINE PRODUCTS, P.O. Drawer 1270, Aransas Pass, TX 78336 (40)
(512) 758-5373
Sal Versaggi, VERSAGGI FLEET, INC., P.O. Box 5777, Tampa, FL 33675 (20)
(813) 248-5089

The following 5 operators, whose catch goes to GULF SHRIMP PROCESSORS in Port Isabel, TX, have a combined fleet of about 40 shrimp boats.

Carl M. Ga[illegible]n, Star Route Box 40, Brownsville, TX 78521
(512) [illegible]-4839
Frank Las[illegible]e, Star Route Box 5, Brownsville, TX 78521
(512) [illegible]-4390
Guy Pete, Star Route Box 55, Brownsville, TX 78521
(512) 831-4706
Jimmy Russell, Star Route Box 55, Brownsville, TX 78521
(512) 831-3241
Fred M. Vidos, Star Route Box 8, Brownsville, TX 78521
(512) 831-4328

11. OCEANOGRAPHIC RESEARCH VESSELS

Information on oceanographic research vessels operated by NOAA, USGS, and NSF can be obtained from the following contacts. (See Table 9-1.)

CDR Fidel Smith, Office of Fleet Operations, National Ocean Survey, C-71, NATIONAL OCEANOGRAPHIC AND ATMOSPHERIC ADMINISTRATION, Rockville, MD 20852
(301) 443-8641
Ship Manager, Pacific-Arctic Branch of Marine Geology, U.S. GEOLOGICAL SURVEY, 345 Middlefield Rd., Menlo Park, CA 94025
(415) 232-8111
Director, Division of Polar Programs, NATIONAL SCIENCE FOUNDATION, 1800 G St., N.W., Washington, D.C. 20550
(202) 632-4024

Information on U.S.-flag oceanographic vessels operated by UNOLS Member Institutions can be obtained from UNOLS or from the individual institutions, listed below. This list includes vessel name and length (LOA, in meters), and also indicates those vessels that are owned by the Navy or NSF.

Thomas R. Stetson, Executive Secretary, UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM, Woods Hole Oceanographic Institution, Woods Hole, MA 02543
(617) 548-1400, ext. 352

Dr. J. R. Moore, Director, Institute of Marine Science, UNIVERSITY OF ALASKA, Fairbanks, AK 99701
(907) 479-7531
ACONA (26 m, NSF)
Dr. W. R. Taylor, Assistant Director for Research, CHESAPEAKE BAY INSTITUTE, Johns Hopkins University, Baltimore, MD 21218
(301) 338-8231
R. WARFIELD (32 m), MAURY (20 m)
Wadsworth Owen, Director of Marine Operations, College of Marine Studies, UNIVERSITY OF DELAWARE, Lewes, DE 19958
(302) 645-4320
CAPE HENLOPEN (37 m)
Dr. Richard T. Barber, Cooperative Oceanographic Program, DUKE UNIVERSITY MARINE LABORATORY, Beaufort, NC 28516
(919) 728-2111
EASTWARD (36 m), JOHN De WOLF II (19 m)
J. Frisbee Campbell, Scientific Coordinator for Marine Operations, Hawaii Institute of Geophysics, UNIVERSITY OF HAWAII, 2525 Correa Rd., Honolulu, HI 96822
(808) 948-7654
MOANA WAVE (53 m, Navy), KANA KEOKI (48 m)

Dr. Dennis Hayes, LAMONT-DOHERTY GEOPHYSICAL OBSERVATORY, Columbia University, Palisades, NY 10964
(914) 359-2900 ext. 470
CONRAD (64 m, Navy), VEMA (60 m)

James Gibbons, Operations Manager, Rosenstiel School of Marine & Atmospheric Sciences, UNIVERSITY OF MIAMI, 10 Rickenbacker Causeway, Miami, FL 33149
(305) 350-7223
GILLISS (64 m, Navy), ISELIN (52 m), CALANUS (20 m)

Clifford Tetzloff, Marine Superintendent, Great Lakes & Marine Waters Center, I.S.T. Building, UNIVERSITY OF MICHIGAN, Ann Arbor, MI 48105
(313) 763-3183
LAURENTIAN (24 m), MYSIS (15 m)

Mary Jo Gutierrez, Ship Scheduling Officer, School of Oceanography, OREGON STATE UNIVERSITY, Corvallis, OR 97331
(503) 754-4447
WECOMA (54 m, NSF), CAYUSE (24 m)

James J. Griffin, Director of Technical Services, Graduate School of Oceanography, UNIVERSITY OF RHODE ISLAND, Narragansett, RI 02882
(401) 792-6110
ENDEAVOR (54 m, NSF)

Capt. Robert B. Haines, Ship Scheduler, Code A-010, SCRIPPS INSTITUTION OF OCEANOGRAPHY, University of California at San Diego, La Jolla, CA 92093
(714) 452-2840
MELVILLE (75 m, Navy), T. WASHINGTON (64 m, Navy), ALPHA HELIX (41 m), E. B. SCRIPPS (29 m)

Dr. David W. Menzel, Director, SKIDAWAY INSTITUTE OF OCEANOGRAPHY, University of Georgia, P.O. Box 13687, Savannah, GA 31406
(912) 356-2480
BLUE FIN (22 m)

E. B. Veek, Associate Director for Facilities, Institute for Marine & Coastal Studies, UNIVERSITY OF SOUTHERN CALIFORNIA, University Park, Los Angeles, CA 90007
(213) 741-6840
VALERO IV (34 m), SEA WATCH (20 m)

Dr. Peter T. Flawn, Acting Director, Marine Operations, UNIVERSITY OF TEXAS, P.O. Box 7999, Austin, TX 78712
(512) 471-4816
LONGHORN (24 m)

Capt. T. K. Treadwell, Marine Operations Officer, Department of Oceanography, TEXAS A&M UNIVERSITY, College Station, TX 77843
(713) 845-7211
GYRE (53 m, Navy)

Dr. George C. Anderson, Associate Chairman for Research, Ocean Teaching Bldg., WB-10, UNIVERSITY OF WASHINGTON, Seattle, WA 98195
(206) 543-5087
T. G. THOMPSON (68 m, Navy), HOH (20 m, Navy), ONAR (20 m, Navy)

Capt. R. P. Dinsmore, Chief, Marine Facilities & Operations, WOODS HOLE OCEANOGRAPHIC INSTITUTION, Woods Hole, MA 02543
(617) 548-1400, ext. 510
KNORR (75 m, Navy), ATLANTIS II (64 m), OCEANUS (54 m, NSF)

In addition to the above-listed UNOLS Member Institutions, a number of other institutions operate oceanographic vessels that are registered with UNOLS but for which operating schedules have not been received by UNOLS or are not prepared in advance. Information on these can be obtained from the contacts listed below. Again, vessel names and lengths are included.

Byron F. Morris, BERMUDA BIOLOGICAL STATION, St. George's West, Bermuda
(809) 297-1880
PANULIRUS II (19 m)

Ed Foss, CAPE FEAR TECHNICAL INSTITUTE, 411 North Front St., Wilmington, NC 28401
(919) 763-9876, ext. 48
ADVANCE II (56 m)

Sung Feng, Marine Science Institute, UNIVERSITY OF CONNECTICUT, Southeast Branch, Avery Point, Groton, CT 06340
(203) 446-1020, ext. 211
T-441 (20 m)

G. W. Flagler, FLORIDA STATE UNIVERSITY, Tallahassee, FL 32306
(904) 644-3450
TURSIOPS (20 m)

M. O. Rinkel, Institute of Oceanography, FLORIDA STATE UNIVERSITY SYSTEM, 830 First St., South, St. Petersburg, FL 33701
(813) 893-9100
BELLOWS (20 m)

H. D. Howse, GULF COAST RESEARCH LABORATORY, P.O. Drawer AG, Ocean Springs, MS 39564
(601) 259-2675
GULF RESEARCHER (20 m)

Dr. R. S. Jones (or J. E. Buhler), HARBOR BRANCH FOUNDATION, INC., RFD 1, Box 196, Fort Pierce, FL 33450
(305) 465-2400
JOHNSON (38 m), GOSNOLD (30 m)

F. Richard Wilkins (or James M. Klas), HOBART & WILLIAM SMITH COLLEGES, Geneva, NY 14456
(315) 789-5500
HOBART & WILLIAM SMITH EXPLORER (20 m)

J. Gast, HUMBOLDT STATE UNIVERSITY, Arcata, CA 95521
(707) 826-3466
CATALYST (31 m)

John Valois, MARINE BIOLOGICAL LABORATORY, Woods Hole, MA 02543
(617) 548-3705, ext. 325
A.E. VERRILL (20 m)

Fred Rees, MARINE ENVIRONMENTAL SCIENCES CONSORTIUM, Dauphin Island Sea Laboratory, P.O. Box 386, Dauphin Island, AL 36528
(205) 861-2141
G. A. ROUNSEFELL (20 m)

J. E. Alexander, THE MARINE SCIENCE CONSORTIUM, P.O. Box 16, Wallops Island, VA 23337
(804) 824-5636
ANNANDALE (27 m), DELAWARE BAY (15 m)

Elgin A. Dunnington, Chesapeake Biological Laboratory, UNIVERSITY OF MARYLAND, Solomons, MD 20688
(301) 326-4281
AQUARIUS (20 m), ORION (17 m)

Arthur Clifton, Massachusetts Sea Grant Program, Bldg. 1, Room 211, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, MA 02139
(617) 253-7136
EDGERTON (20 m)

John Martin, MOSS LANDING MARINE LABORATORY, P.O. Box 223, Moss Landing, CA 95039
(408) 633-3304
OCONOSTOTA (30 m)

J. R. Schubel, Marine Sciences Research Center, STATE UNIVERSITY OF NEW YORK, Stony Brook, NY 11794
(516) 246-6543
ONRUST (17 m)

R. A. Sweeney, STATE UNIVERSITY COLLEGE AT BUFFALO, 1300 Elmwood Ave., Buffalo, NY 14222
(716) 862-5422
C. A. DAMBACH (20 m)

Dr. George Lawniczak (or Capt. Stuart Eichner), Ocean Sciences Center, NOVA UNIVERSITY, 8000 North Ocean Dr., Dania, FL 33004
(305) 587-6660
YOUNGSTER III (19 m)

J. S. Stephens, Jr., Department of Biology, OCCIDENTAL COLLEGE, 1600 Campus Rd., Los Angeles, CA 90041
(213) 259-2675
VANTUNA (26 m)

J. C. Ludwick, Institute of Oceanography, OLD DOMINION UNIVERSITY, Box 6173, Norfolk, VA 23508
(804) 489-6477
LINWOOD HOLTON (20 m)

Dr. M. L. Hernandez-Avila, Department of Marine Sciences, UNIVERSITY OF PUERTO RICO, Mayaguez, Puerto Rico 00708
(809) 832-4040, ext. 3439
CRAWFORD (38 m), MEDUSA (17 m)

C. D. Litchfield, Marine Sciences Department, RUTGERS UNIVERSITY, P.O. Box 1179, Piscataway, NJ 08854
(201) 932-3080
RUTGERS (19 m)

Corwith Cramer, Jr., SEA EDUCATION ASSOC., P.O. Box 6, Woods Hole, MA 02543
(617) 540-3954
WESTWARD (30 m)

Richard Ibara, SOUTHEASTERN MASSACHUSETTS UNIVERSITY, North Dartmouth, MA 02747
(617) 997-9321, ext. 415
CORSAIR (20 m)
Capt. Brian Hathaway, Department of Marine Science & Technology, SOUTHERN MAINE VOCATIONAL TECHNICAL INSTITUTE, Fort Road, South Portland, ME 04106
(207) 799-7303
AQUALAB III (44 m)
Officer in Charge, TUDOR HILL LABORATORY, FPO New York 09560
(809) 294-0170
ERLINE (32 m)
D. F. Leipper, Department of Oceanography, U.S. NAVAL POSTGRADUATE SCHOOL, Monterey, CA 93940
(408) 646-2553
ACANIA (38 m)
J. M. Zeigler, VIRGINIA INSTITUTE OF MARINE SCIENCE, Gloucester Point, VA 23062
(804) 642-2111
VIRGINIA SEA (44 m), RETRIEVER (35 m), LANGLEY (24 m), PATHFINDER (17 m)
D. F. Mraz, Center for Great Lakes Study, UNIVERSITY OF WISCONSIN - MILWAUKEE, Milwaukee, WI 53201
(414) 963-5095
NEESKAY (20 m)

12. DREDGES

The following are major owner-operators of U.S.-flag dredges (see Table 9-3).

AMERICAN DREDGING CO., 12 South 12th St., Philadelphia, PA 19107
(215) 628-3000
C. F. BEAN CORP., One Shell Square, Suite 3700, New Orleans, LA 70139
(504) 581-1583
BOHEMIA, INC., Umpqua Division, 2280 Oakmont Way, Eugene, OR 97401
(503) 342-6262
BULTEMA MARINE TRANSPORTATION, P.O. Box 728, Muskegon, MI 49443
(616) 722-6641
CONSTRUCTION AGGREGATES CORP., 120 S. LaSalle St., Chicago, IL 60603
(312) 332-3210
DILLINGHAM OVERSEAS CORP., P.O. Box 3468, Honolulu, HI 96801
(808) 946-0771; TLX: 7430083/8315/63316
E. I. DuPONT de NEMOURS & CO., INC., P.O. Drawer A, Lawley, FL 32058
(904) 782-3201
GREAT LAKES DREDGE & DOCK CO., 228 N. LaSalle St., Chicago, IL 60601
(312) 920-3000
HENDRY CORP., P.O. Box 13228, Tampa, FL 33611
(813) 831-1211
T. L. JAMES & CO., INC., P.O. Box O, Ruston, LA 71270 (Dredging Division: P.O. Box 826, Kenner, LA 70062)
(504) 729-2511

PETER KIEWET, Foot of South 26th St., P.O. Box 1512, Richmond, CA 94802
(415) 232-8477
J. RAY McDERMOTT & CO., INC., P.O. Drawer 38, Harvey, LA 70058
(504) 366-8111
NORFOLK DREDGING CO., P.O. Box 539, Norfolk, VA 23501
(804) 545-7383
PARKHILL-GOODLOE CO., INC., P.O. Box 8707, Jacksonville, FL 32211
(904) 743-4332
POTASHNICK CONSTRUCTION, P.O. Box 190, Cape Giradeau, MO 63701
(314) 334-3081
SMITH-RICE CO., 2199 Clement Ave., Alameda, CA 94501
(415) 523-5925
WEEKS DREDGING & CONTRACTING, INC., 216 North Avenue E, Cranford, NJ 07016
(201) 272-4010
WESTERN CONTRACTING CORP., 400 Benson Bldg., Sioux City, IA 51101
(712) 277-1131
WESTERN PACIFIC DREDGING CORP., Foot of N. Portsmouth Ave., Portland, OR 97203
(503) 285-9111
[or: 135 Cutting Blvd., Richmond, CA 94804; (415) 234-8362]
WILLIAMS-McWILLIAMS CO., INC., P.O. Box 52677, New Orleans, LA 70152
(504) 837-1030

13. FLOATING DRYDOCKS

The following are owner-operators of U.S.-flag floating drydocks over 91.4 m (300 ft) in length, arranged by coast (see Table 9-4).

A) ATLANTIC COAST

BATH IRON WORKS CORP., 700 Washington St., Bath, ME 04530
(207) 443-3311
BETHLEHEM STEEL CORP., Shipbuilding Department, Boston Yard, 256 Marginal St., East Boston, MA 02128
(617) 567-4000
BETHLEHEM STEEL CORP., Shipbuilding Department, Hoboken Yard, 1301 Hudson St., Hoboken, NJ 07030
(201) 659-2070
(New York office: (212) 732-9460)
BETHLEHEM STEEL CORP., Shipbuilding Department, Key Highway Yard, 1101 Key Highway, Baltimore, MD 21230
(301) 752-1000
BREWER DRY DOCK CO., 2945 Richmond Terrace, Mariners Harbor, Staten Island, NY 10303
(212) 981-3500
BROMFIELD CORP., United Shipbuilding Division, 246 Border St., East Boston, MA 02128
(617) 567-8900
BUSHEY & SONS, INC., Dry Dock and Ship Yards, 764 Court St., Brooklyn, NY 11231
(212) 625-3456

DETYENS SHIPYARDS, INC., Route 2, Box 180, Highway 41, Mt. Pleasant, SC 29464
(803) 884-2811

JACKSONVILLE SHIPYARDS, INC., P.O. Box 2347, Jacksonville, FL 32203
(904) 355-1711

MARYLAND SHIPBUILDING AND DRYDOCK CO., P.O. Box 537, Baltimore, MD 21203
(301) 355-0500

NORFOLK SHIPBUILDING AND DRYDOCK CORP., Foot of Liberty St., P.O. Box 2100, Norfolk, VA 23501
(804) 545-3551; TLX: 823613
(New York office: (212) 943-9710)

PERTH AMBOY DRY DOCK CO., Foot of Commerce St., Perth Amboy, NJ 08861
(201) 826-5000
(New York office: (212) 269-6995)

RODERMOND INDUSTRIES, INC., Foot of Henderson St., Jersey City, NJ 07302
(201) 332-3300
(New York office: (212) 964-2881)

SUN SHIPBUILDING AND DRY DOCK CO., Foot of Morton Ave., Chester, PA 19013
(215) 876-9121

TODD SHIPYARDS CORP., Brooklyn Division, Foot of Dwight St., Brooklyn, NY 11231
(212) 625-6820
(New York office: (212) 344-6900)

B) GULF COAST

ALABAMA DRY DOCK AND SHIPBUILDING CO., P.O. Box 1507, Mobile, AL 36601
(205) 690-7011

AVONDALE SHIPYARDS, INC., P.O. Box 50280, New Orleans, LA 70150
(504) 776-2121

BENDER SHIP REPAIR, INC., P.O. Box 42, Mobile, AL 36601
(205) 433-3673

BETHLEHEM STEEL CORP., Shipbuilding Department, Beaumont Yard, P.O. Box 3031, Beaumont, TX 77704
(713) 838-6821

GEOSOURCE, INC., Shipyard Division, P.O. Box 24, 4024 Peters Rd., Harvey, LA 70059
(504) 368-7600

INGALLS SHIPBUILDING, Division of Litton Industries, P.O. Box 149, Pascagoula, MS 39567
(601) 769-6110

LEVINGSTON SHIPBUILDING CO., Front & Mill Streets, P.O. Box 968, Orange, TX 77630
(713) 883-3521

TODD SHIPYARDS CORP., Galveston Division, P.O. Box 1550, Galveston, TX 77553
(713) 744-4581

TODD SHIPYARDS CORP., Houston Division, Houston Ship Channel, P.O. Box 9666, Houston, TX 77015
(713) 453-7261

TODD SHIPYARDS CORP., New Orleans Division, P.O. Box 6158, New Orleans, LA 71074
(504) 366-4121

C) PACIFIC COAST

BETHLEHEM STEEL CORP., Shipbuilding Department, San Francisco Yard, 20th & Illinois Streets, P.O. Box 7963, San Francisco, CA 94120
(415) 621-3200
BETHLEHEM STEEL CORP., Shipbuilding Department, San Pedro Yard, 965 S. Seaside Ave., Terminal Island, CA 90731
(213) 832-3381
CALIFORNIA SHIPBUILDING & DRY DOCK CO., 1601 W. Water St., Long Beach, CA 90802
(213) 436-3281
CAMPBELL INDUSTRIES, P.O. Box 1870, San Diego, CA 92112
(714) 233-7115
LAKE UNION DRYDOCK CO., 1515 Fairview Ave., East, Seattle, WA 98102
(206) 323-6400
LOCKHEED SHIPBUILDING & CONSTRUCTION CO., 2929 - 16th Ave., S.W., Seattle, WA 98134
(206) 292-5656
MERRITT SHIP REPAIR CO., 321 Embarcadero, Oakland, CA 94606
(415) 893-7020
NATIONAL STEEL & SHIPBUILDING CO., P.O. Box 80278, Harbor Dr. & 28th St., San Diego, CA 92138
(714) 232-4011
SWAN ISLAND SHIP REPAIR YARD, The Port of Portland, P.O. Box 3529, Portland, OR 97208
(503) 233-8331; TWX: 910-464-6151
TODD PACIFIC SHIPYARDS CORP., Los Angeles Division, 710 Front St., P.O. Box 231, San Pedro, CA 90733
(213) 832-3361
TODD SHIPYARDS CORP., San Francisco Division, Foot of Main St., Alameda, CA 94501
(415) 523-0321
TODD PACIFIC SHIPYARDS CORP., Seattle Division, 1801 - 16th Ave., S.W., P.O. Box 3806, Seattle, WA 98124
(206) 623-1635

D) GREAT LAKES

BAY SHIPBUILDING CORP., Manitowoc Co., Inc., 605 N. 3rd Ave., Sturgeon Bay, WI 54235
(414) 743-5524
PETERSON BUILDERS, INC., 334 S. First Ave., Sturgeon Bay, WI 54235
(414) 743-5577

E) HAWAIIAN ISLANDS

DILLINGHAM SHIPYARD, P.O. Box 3288, Honolulu, HI 96801
(808) 845-2911; TLX: 7430083/8315/63316

14. MOTOR YACHTS

Information on motor yachts and small craft can be obtained through the Coast Guard Director of Auxiliary, located in each Coast Guard District (see Table 9-5), or through the Auxiliary Flotilla Commander, who is the elected leader of each of the Auxiliary's local units. Coast Guard District addresses follow (see map, Figure B-1).

Commander (dca), FIRST COAST GUARD DISTRICT, 150 Causeway St., Boston, MA 02114
FTS: 8-223-3607
Commander (dca), SECOND COAST GUARD DISTRICT, 1320 Olive St., St. Louis, MO 63103
FTS: 8-279-5821
Commander (dca), THIRD COAST GUARD DISTRICT, Governors Island, New York, NY 10004
FTS: 8-664-4905

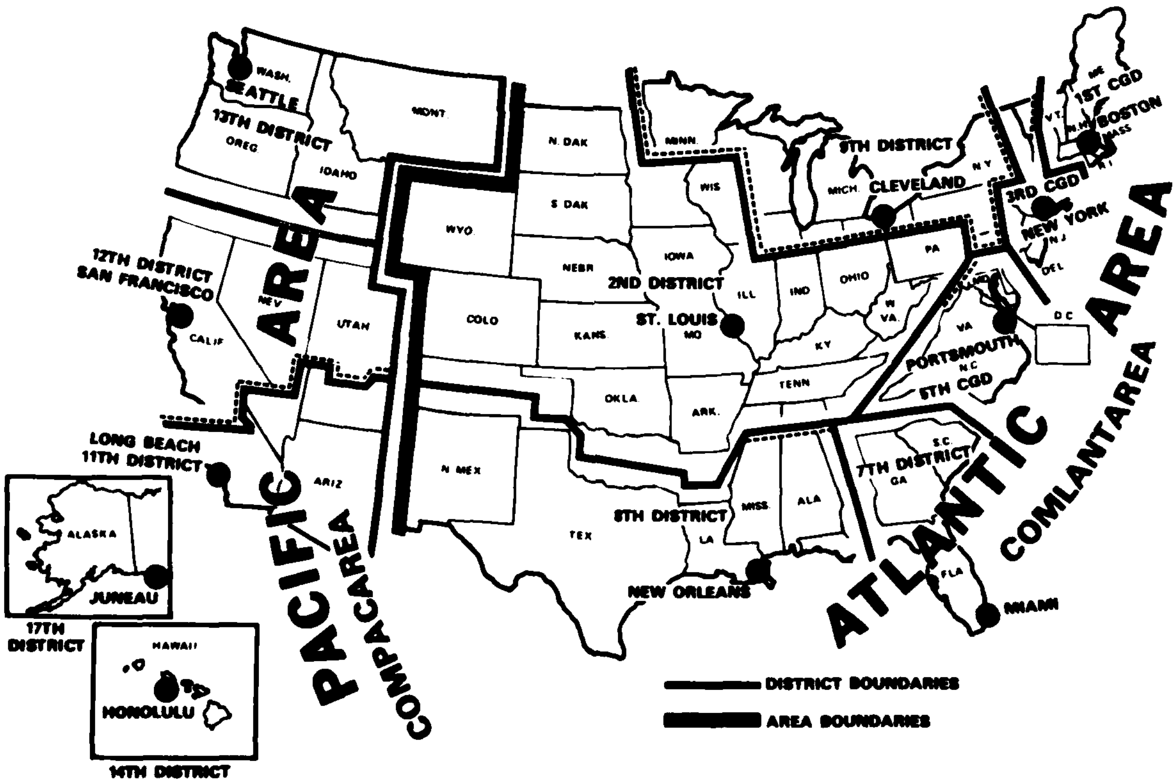

FIGURE B-1 U.S. Coast Guard districts

Commander (dca), FIFTH COAST GUARD DISTRICT, Federal Bldg, 431 Crawford St., Portsmouth, VA 23705
FTS: 8-924-9207
Commander (dca), SEVENTH COAST GUARD DISTRICT, Federal Bldg., 51 S.W. 1st Ave., Miami, FL 33130
FTS: 8-350-5698
Commander (dca), EIGHTH COAST GUARD DISTRICT, Hale Boggs Federal Bldg., 500 Camp St., New Orleans, LA 70130
FTS: 8-682-6629
Commander (dca), NINTH COAST GUARD DISTRICT, 1240 East 9th St., Cleveland, OH 44199
FTS:8-293-4410
Commander (dca), ELEVENTH COAST GUARD DISTRICT, Union Bank Bldg., 400 Oceangate Blvd., Long Beach, CA 90822
FTS: 8-984-9217
Commander (dca), TWELFTH COAST GUARD DISTRICT, 630 Sansome St., San Francisco, CA 94126
FTS: 8-556-5310
Commander (dca), THIRTEENTH COAST GUARD DISTRICT, Federal Bldg., 915 Second Ave., Seattle, WA 98174
FTS: 8-399-7390
Commander (dca), FOURTEENTH COAST GUARD DISTRICT, Prince Kalanianaole Federal Bldg., 300 Ala Moana Blvd., 9th Floor, Honolulu, HI 96850
546-5575 (CGD-14 through San Francisco FTS operator: 556-0220)
Commander (dca), SEVENTEENTH COAST GUARD DISTRICT, P.O. Box 3-5000, Juneau, AK 99802
586-7256 (CGD-17 through Seattle FTS operator: 399-0150)

15. PASSENGER-VEHICLE FERRIES

The following are major owner-operators of U.S.-flag passenger-vehicle ferries.

W.R. Hudson, Director, DIVISION OF MARINE HIGHWAY SYSTEMS, Department of Transportation and Public Facilities, State of Alaska, Pouch R, Juneau, AK 99811
(907) 465-3955
Clifford J. Roe, Operations Manager, WASHINGTON STATE FERRIES, Ferry Terminal (Pier 52), Seattle, WA 98104
(206) 464-7800

16. MARINE SALVAGE VESSELS

The following is the operator of the only active, privately owned, U.S.-flag dedicated salvage vessel.

FRED DEVINE DIVING AND SALVAGE, INC., 6211 N. Ensign, Portland, OR 97217
(503) 283-5285

17. ADVANCED MARINE VEHICLES

A) AIR CUSHION VEHICLES

The ACV passenger ferry (HM-2 Mark III) owned by the COMMONWEALTH OF MASSACHUSETTS and the 2 ACV fireboats (HM-2 Mark IV) ordered by the City of TACOMA, Washington, were manufactured by

HOVERMARINE TRANSPORTATION, LTD., Hazel Wharf, Hazel Rd., Woolston, Southampton SO2 7GB, England

whose U.S. representative is

HOVERMARINE CORP. (OTC), 3 Gateway Center, Pittsburgh, PA 15222

B) SURFACE EFFECT SHIPS

Construction of the 33.5-m (110-ft) air cushion-assisted SES--designed for offshore, patrol, customs, crewboat, ferry, security, or fire service--is a joint venture of

BELL AEROSPACE DIVISION, Textron, Inc., P.O. Box 1, Buffalo, NY 14240
(716) 297-1000

and

HALTER MARINE SERVICES, INC., P.O. Box 29266, New Orleans, LA 70189
(504) 254-1222; TLX: 58-4200

C) HYDROFOILS

Of the 6 hydrofoils now in U.S. commercial service, 3 are used for 10-minute sightseeing tours at SEA WORLD in San Diego. The other 3 are PT-150 vessels, operated between Miami, Florida, and Nassau and Freeport in the Bahamas by

BAHAMA HYDROFOIL CRUISES, INC., 903 South American Way, Miami, FL 33132

and manufactured by

SUPRAMAR AG, Ausserseld 5, Clt 6362, Stansstad, Switzerland

The 3 Jet-Foil craft previously used in Hawaiian inter-island service and the one used in experimental Jet-Foil passenger service between Seattle, Washington, and Victoria, British Columbia, were manufactured by

BOEING MARINE SYSTEMS, P.O. Box 3707, Seattle, WA 98124
(206) 655-6135

APPENDIX C

SELECTIVE BIBLIOGRAPHY

PRINCIPAL SOURCES

For many of the industry sectors covered in this report, the most comprehensive, publicly available publications are the American Bureau of Shipping (ABS) Record (Reference 4 in this bibliography)--and similar publications of the major foreign classification societies (e.g., Lloyd's Register, Ref. 56)--and the U.S. Coast Guard's Merchant Vessels of the United States (Ref. 12) and its Monthly Supplement (Ref. 14). (See also the discussion of "Computerized Information Files", below.)

However, for several sectors, other information sources provide both a more comprehensive listing of vessels and more detailed data on each. Notable among these are: for the tug-barge sectors, the Corps of Engineers' annual "Transportation Series 5" (Ref. 19); for the offshore service and supply sector, the compilations published by the Fleet Data Service (Ref. 34, 35, 36) and Clarkson (Ref. 11); and, for the oceanographic research vessels, material available from University-National Oceanographic Laboratory System (UNOLS) publications and files (Ref. 99, 100, 101).

A number of other sources of vessel listings and characteristics are included in the bibliography. Major sources of fleet data on one or more vessel types are indicated by an asterisk (*). Each includes one or more listings of (a) vessels with owner-operators and princial vessel characteristics or (b) owner-operators with types and numbers of vessels.

Major shipbuilding data sources are indicated by a cross (+). Each lists (a) recent vessel deliveries, (b) vessels under construction and on order, and/or (c) shipyards and their capabilities.

Listed below, by industry sector, are references to principal sources used in compiling the information included in this report. In all cases, the cited references were supplemented by other sources listed in the bibliography, as well as by direct industry contacts. In some cases, the cited references were secondary in importance to the

information obtained from these industry contacts (see also Appendixes B and D).

1. Ocean-Classed Tugs--4, 5, 12, 19, 35, 55, 63
2. Ocean-Classed Barges:
   A. Transport Barges--4, 5, 12, 19
   B. Crane and Derrick Barges--4, 5, 12, 17, 19, 33, 34, 59
   C. Specialized Barges (drilling platform, drilling tender, pipe-laying, and pipe-burying barges)--4, 5, 12, 19
   D. Power-Generating Barges--4, 41
3. Integrated Tug-Barge Systems--4, 5, 12, 19, 86
4. Offshore Service and Supply Vessels--11, 12, 34, 35, 63, 64, 105
5. Drillships and Semisubmersibles--30, 88, 98
6. Tuna Boats--12, 14, 38, 76, 77
7. Menhaden Vessels--(main sources: industry contacts)
8. King Crab Vessels--38
9. Trawlers and Groundfishing Vessels--(main sources: industry contacts)
10. Shrimp Boats--(main sources: industry contacts)
11. Oceanographic Research Vessels--29, 43, 78, 81, 84, 98, 99, 100, 101
12. Dredges--4, 31, 52, 56, 59, 70, 108
13. Floating Drydocks--4, 26, 52, 56, 59, 66, 70, 90
14. Motor Yachts--12, 15
15. Passenger-Vehicle Ferries--(main sources: industry contacts)
16. Marine Salvage Vessels--4, 33, 34, 35, 36, 52, 55, 56, 59
17. Advanced Marine Vehicles (Air Cushion Vehicles, Surface Effect Ships, and Hydrofoils)--50, 68

Note: In the above listing, Ref. 12 refers to computer print-outs generated for Committee use by the Coast Guard from its "Merchant Vessels of the United States" information file, as well as to the publication of the same name. (See "Computerized Information Files", below.)

COMPUTERIZED INFORMATION FILES

Of the U.S. organizations that regularly engage in the collection and computer processing of data on U.S.-flag merchant vessels, major information sources include the ABS, Coast Guard, and Corps of Engineers. The first two of these regularly update their computerized information files. The ABS System (ABSIRS, Ref. 5) and two of the Coast Guard's eight systems (the "Merchant Vessels of the United States" file, described under Ref. 12; and the "Ship Information Library" file, Ref. 17) are described in the bibliography. The Corps updates its data on the basis of annual questionnaire responses, using computers to generate its "Transportation Series" publications (Ref. 19, 20, 21).

Among these data banks, coverage differs widely. The Corps restricts its data to U.S.-flag vessels engaged in transportation of

freight or passengers in the U.S. domestic (coastal, Great Lakes, and inland waterways) trades. Vessels as small as 5 nrt appear in its listings. The "Merchant Vessels of the United States" file includes all U.S. vessels having uncanceled Coast Guard documents (a certificate of registry, required for foreign trade or foreign operations; either enrollment and licensing or licensing only, required for vessels operating domestically), generally of 5 nrt or over. (While this is a very complete listing of U.S. vessels over 5 nrt, there are indications that the records for certificated vessels are not as current as those of vessels under enrollment or license, because only the latter require annual renewal.) The Coast Guard's "Ship Information Library" includes all (about 17,000) vessels over 4,000 dwt. While ABSIRS includes over 52,000 vessels, worldwide ("virtually all sizeable vessels in existence"), it omits many of the smaller vessels covered by the Corps and by the Coast Guard "Merchant Vessels of the United States" data.

The four data banks also differ markedly in the data elements recorded for each vessel. The few elements common to all four systems include vessel name, flag, length (although this is variously given as LOA, LBP, or both), breadth or beam, horsepower (which may be either bhp or shp), and year built. Even vessel owner and operator are not uniformly listed. Both are available from ABSIRS (and, generally, on vessels in the Coast Guard's "Ship Information Library" system, which obtains much of its data from the ABS). The "Transportation Series" lists only the operator, and the Coast Guard's "Merchant Vessels of the United States" file lists only the owner (which may be also the operator but, in many cases, is listed as a financial institution). In some systems, the vessel is identified by type; in others, by type of service (although, again, the two often coincide).

For the vessels it includes, the ABSIRS data is by far the most detailed. The data sources for the Coast Guard's "Ship Information Library" system are the ABS, Lloyd's, and Det Norske Veritas; thus, its data elements are a subset of the ABSIRS data for every vessel covered by both systems.

The Coast Guard's "Merchant Vessels of the United States" file lists grt (but not nrt) and depth (but not draft), which is just the opposite of the Corps' "Transportation Series" listings. Data elements listed by the Corps but not covered in the Coast Guard's "Merchant Vessels" system include (in addition to draft and nrt) the types of cargo handling equipment; navigation and communications equipment; and maximum height above water (when light) and nature of the highest point of fixed superstructure.

Neither the "Transportation Series" listings nor the Coast Guard's "Merchant Vessels" file distinguishes between vessels (e.g., tugs and barges) classed for ocean service and those classed for inland waterways service--although knowledgeable industry personnel can usually identify the vessel's class from its principal characteristics such as size, draft, and horsepower.

The ABS, Coast Guard, and Corps of Engineers differ in the purposes of their data collection efforts. They operate under different constraints, including industry information needs in the case of ABS and statutory authority and funding levels in the case of the two federal agencies. Accordingly, their computerized information files differ

markedly in the types, sizes, and numbers of vessels covered and in the data elements recorded for each vessel. (They differ also in their data sources, methods of data collection and verification, and methods and frequency of updating.) Thus, obtaining information that is complete, accurate, and current enough for realistic contingency planning will require considerable cross-checking and careful verification.

Note: Other computerized information sources of potential use in contingency planning, but not used in preparing this report, include the Navy's "Integrated Sealift System" (see Ref. 27).

Eight computerized information files are maintained and accessed by the Coast Guard's Office of Merchant Marine Safety. Two of these, discussed above, were judged to be of major importance in the context of this report. The other six, whose primary uses relate to the Coast Guard's safety and environmental regulatory functions, are: (1) the Inspected Vessel File, (2) the Commercial Vessel Casualty File, (3) the Foreign Tankship Examination File, (4) the Interim Marine Safety Information System, (5) the Pollution Incident Reporting System (PIRS), and (6) Worldwide Tanker Casualty Data. In three cases, all tapes and devices are maintained at the Coast Guard Headquarters computer center; in two others, the data are stored elsewhere with entry, edit, and retrieval by remote terminals within Coast Guard Headquarters or its regional offices; and one of the systems is privately maintained and provided through a commercial source. Information on these Coast Guard systems can be obtained from the source noted under Ref. 12.

REFERENCES

1. Ackley, Richard T., CDR, USN (Ret.), "The Fishing Fleet and Soviet Strategy", U.S. Naval Institute Proceedings, Vol. 101, No. 7 (July 1975), pp. 30-38.

2. "Advanced Emergency Vessel Goes into North Sea Service," Offshore Engineer, 1978, No. 5 (May), pp. 112-113. [Describes oil field firefighting and rescue vessel.]

3. Alaska Fishermen's Journal (Seattle, WA: Waterfront Press, monthly).

* 4. American Bureau of Shipping, Record of the American Bureau of Shipping: Annual Directory (New York: annual).

[Note: The ABS is the U.S. vessel classification society. In its primary function of certifying the soundness and seaworthiness of merchant vessels, it is the ABS' responsibility to verify that submitted plans adhere to accepted standards for construction of hull and machinery, embodied in its "Rules". The ABS Rules are internationally recognized, and ABS certification is generally accepted by the Coast Guard as evidence of compliance with certain of its regulations. To remain "in class", vessels must be recertified periodically, as well as when converted or when major repairs are necessitated by a marine casualty. Original, periodic, and damage surveys are conducted by ABS surveyors, based in major U.S. and foreign ports. Thus, the ABS is the primary U.S. source of detailed data on vessels of many categories.

In the Record, information is arranged by vessel name. Listed are a maximum of 230 data elements on each. Data are grouped under 8 main categories: (1) Vessel (identification, including official numbers, radio call-sign, owner, flag, home port, former names and dates of changes, and types of communications/navigation equipment), (2) Dimensions, (3) Tonnages, (4) Capacities, (5) Hull, (6) Machinery, (7) Builders (including nature of conversions and major repairs, when completed, and performing shipyards), and (8) Classification.

See also note under Reference 5, below.]

*+ 5. American Bureau of Shipping Information Retrieval System (ABSIRS), computerized information file.

[Note: ABSIRS is a computer system for the storage, correlation, and retrieval of maritime information. Developed by ABS, the system is available to users through an exclusive licensing agreement with ABS Computers, Inc. (ABSCOMP), one of the wholly-owned ABS group of companies.

The ABSIRS Master File contains all data published in the ABS Record (Reference 4, above), which covers about 52,000 vessels worldwide. This encompasses virtually all sizeable vessels, of which perhaps one quarter have been classed by ABS

and the rest by other national classification societies. Master File particulars include vessel name, owner, builder, dimensions, machinery, flag, tonnages, date built, and aids to navigation. A typical page of the ABS Record is indicative of the detailed data elements available from the Master File.

The ABSIRS Master File is supplemented by 6 other files. The Hull/Machinery Construction Note File stores details of ABS classification, including particulars on characteristics of hull construction and materials, and machinery items and associated components. The Technical Notes File contains service data limited to statistical compilations and correlations concerning vessels classed with ABS since 1965. The On-Order File carries data on vessels over 1,000 grt on order or under construction, worldwide, including dates of keel laying, launching, and projected completion; and tonnages, dimensions, machinery, and other major items. The use of data in these three files is restricted under licensing agreements.

The Owners File lists the names and addresses of owners, agents, and operators of all ABS-classed vessels apearing in the Record. The Shipbuilding and Drydock File lists names, locations, capabilities, and description of shipbuilding, dry dock, and repair facilities, worldwide. Finally, the Dead File stores data on any vessel, previously included in the Master File, that has ended its service life.

Each field of information can be queried separately or in conjunction with any other field. Outlines showing the fields of information available in each file are available from ABSIRS. Output can be produced as standard computer listings or on magnetic tape. Retrieval fees vary with the types and amount of data required. The turn-around norm is 72 hours.

Further information on ABSIRS data files and service fees is available from:

General Manager
ABS Computers, Inc.
45 Broad St.
New York, NY 10004
(212) 785-9800; TLX: ITT 421-966 or
RCA 233090; TWX: 710-581-3089]

*+ 6. The American Fisheries Directory and Reference Book (Camden, ME: National Fisherman, 1979).

7. Barracca, Peter S., and Warren D. Thomas, "Clearing the Suez: How Murphy Pacific Removed 10 Wrecks Blocking the 101-Mile Canal," reprint from Offshore Industry, Mar. 1975.

8. BDM Corporation, A Supply-Demand Analysis of the Mobile Oil Drilling Rig and Support Craft Markets; 3 volumes (Vol. 1, A Supply-Demand Analysis of the Mobile Offshore Drilling Rig Market, 1977-1987; Vol. 2, A Supply-Demand Analysis of the Offshore Oil Industry Support Craft Market; Vol. 3, A Supply-Demand Analysis of the Mobile Oil Drilling Rig and Support Craft Markets: Executive Summary); prepared for Maritime Administration (McLean, VA: Oct. 1977).

9. Brown, Gen. George S., USAF, United States Military Posture for FY 1979; annual Statement to the Congress by the Chairman of the Joint Chiefs of Staff, Department of Defense (Washington: Jan. 20, 1978).

10. "City of Tacoma Awards Contract fo Two Hovermarine Craft for Harbor Firefighting", Maritime Reporter, Vol. 40, No. 12 (June 15, 1978), p. 7.

* 11. Clarkson, H., & Co., Ltd., Offshore Service Vessel Register (London: annual). [Covers world fleet of offshore service and supply vessels.]

* 12. Coast Guard, Merchant Vessels of the United States, Publication CG-408 (Washington: U.S. Government Printing Office, annual).

[Note: This volume, published in compliance with provisions of an Act of Congress approved July 5, 1884 (46 U.S.C. 4), contains information on all U.S.-flag merchant vessels and yachts having uncanceled marine documents (register, enrollment and license, or license). A certificate of registry is required for foreign trade or foreign operations; either enrollment and licensing or licensing only, for vessels operating only domestically. All vessels of 5 net register tons (nrt) or over must be documented, but documentation is generally not required for vessels under 5 nrt.

The information is arranged by vessel name. Listed are official number; radio call-sign; vessel rig; gross and net register tonnage; length, breadth, and depth; hull material; when and where built; type of service; horsepower; owner; and home port.

The information source of this publication and for its Monthly Supplement (Reference 14, below) is the "Merchant Vessels of the United States" computerized information file, which is maintained at the Coast Guard Headquarters computer center. The file, containing about 25 data elements for each vessel, is updated monthly.

Further information on the Coast Guard data files can be obtained from:

Chief
Information and Analysis Staff
Office of Merchant Marine Safety (G-MA-83)
U.S. Coast Guard
Washington, D.C. 20590
(202) 426-9561]

13. Coast Guard, Military Preparedness, Coast Guard Mission Series, CG 378-3 (Washington: Mar. 1978).

* 14. Coast Guard, Monthly Supplement to "Merchant Vessels of the United States" (Washington: U.S. Government Printing Office). [See note under Reference 12, above.]

15. Coast Guard, Policy Planning and Information Analysis Staff, Recreational Boating in the Continental United States in 1973 and 1976:

The Nationwide Boating Survey, Final Report; Report No. CG-B-003-78 (Washington: Department of Transportion, Mar. 1978).

16. Coast Guard, SAR Facility Location Booklet; published by Flag Plot for use in conjunction with Morning Operations Highlights (Washington: Jan. 1, 1978.)

* 17. Coast Guard, "Ship Information Library" computerized information file.

[Note: This file contains information on all vessels over 4,000 dwt. The source is the Maritime Data Network (MARDATA), Stamford, Connecticut. The primary data sources are 3 national classification societies: the American Bureau of Shipping, Lloyd's Register, and Det Norske Veritas. The file, which the Coast Guard uses for statistics and program support, contains data on about 17,000 vessels. The data are stored by GE Information Services, with retrieval by remote terminal in Coast Guard Headquarters.

Information on each vessel includes: ship name, official number, and year of name change; owner and owner identification number; classification; type; flag; gross register tonnage; deadweight and displacement; length (LOA and LBP), beam, and depth; draft; cubic capacities (grain and liquid); estimated tons per inch (immersion); machinery type, horespower, speed, and estimated fuel consumption; builder, builder identification number, builder's hull number, and delivery date; date of conversion; dates of last special survey and special survey number; date of last or next drydocking; whether or not casualty data is on file; the data source and time of last update.

Further information on the "Ship Information Library" file can be obtained from the source noted under Reference 12, above.]

18. Coast Guard, The U.S. Coast Guard: Its Missions and Objectives (Washington: U.S. Government Printing Office, 1977).

* 19. Corps of Engineers, U.S. Army, Waterborne Commerce Statistics Center, Transportation Lines on the Atlantic, Gulf, and Pacific Coasts, Transportation Series Number 5 (New Orleans: annual).

[Note: The Corps of Engineers' "Transportation Series" is updated annually, under authority contained in the River and Harbor Act of 1922 (42 R.S. 1043). It contains information only on U.S.-flag vessels engaged in, or available for, transportation of freight and passengers. Of the vessel types covered in this report, only tugs (including salvage vessels), transport barges, integrated tug-barge systems, and some types of offshore service and supply vessels are included. General ferries, fishing vessels, recreational craft, and vessels used in construction, drilling, and exploration are excluded.

The information, collected by questionnaire, is arranged by operator. Listed for each vessel are name, type, and construction; net register tonnage; length, breadth, and draft (loaded and light); horsepower; cargo and passenger capacities;

maximum height above water of fixed superstructure (when light) and nature of highest point; cargo handling equipment; location of operating base; and year built or rebuilt. Type of service (ICC-regulated common or contract; exempt, for hire; or private), principal commodities carried, and geographic areas of operation are given by operator, but are not vessel-specific.

The "Transportation Series" publications and further information are available from:

District Engineer
U.S. Army Engineer District
P.O. Box 60267
New Orleans, LA 70160]

* 20. Corps of Engineers, U.S. Army, Waterborne Commerce Statistics Center, Transportation Lines on the Mississippi River System and the Gulf Intracoastal Waterway, Transportation Series Number 4 (New Orleans: annual). [See note, Reference 19, above.]

* 21. Corps of Engineers, U.S. Army, Waterborne Commerce Statistics Center, Transportation Lines on the Great Lakes System, Transportation Series Number 3 (New Orleans: annual). [See note, Reference 19, above.]

22. Department of the Army, Marine Crewman's Handbook, Technical Manual TM 55-501 (Washington: Sept. 1972).

23. Department of the Army, Marine Equipment Characteristics and Data, Technical Manual TM 55-500 (Washington: Feb. 1968). [Coverage includes military craft, but not commercial craft.]

24. Department of the Army, Transportation Reference Data, Field Manual FM 55-15 (Washington: Feb. 1968, with changes through May 1978).

25. Department of Commerce, 1963 Census of Commercial Fisheries (Washington: U.S. Government Printing Office, 1963). [This has not been updated. The most recent previous survey was in 1908.]

*+26. Department of Defense and Department of Commerce, Coordinator of Shipbuilding, Conversion and Repair, Principal Shipbuilding and Repair Facilities of the United States (by Coastal Areas and Port Groupings) (Washington: Naval Sea Systems Command, periodic), 2d ed., June 1, 1975. [Coverage includes floating drydocks.]

* 27. Department of the Navy, "Integrated Sealift System" (ISS), computerized information file.

[Note: This data base was not known to the study committee until data collection had been completed. (It is, thus, the only source listed here that was not used in preparing this report.) Nevertheless, it is included because of its potential value and availability for contingency planning. It contains information on many of the vessel types covered in this report. Information on the ISS is available from:

Director, Command Information Systems
Military Sealift Command (M-8)
Nassif Bldg.--Room 508
5611 Columbia Pike
Falls Church, VA 22041
(202) 756-1840]

+28. "Directory of Boat Yards", The Fish Boat, Vol. 23, No. 2 (Feb. 1978), pp. 28, 30, 33. [Includes U.S. builders of all types of fishing vessels.]

* 29. "Directory of Geophysical Survey Vessels", Sea Technology, Vol. 19, No. 9 (Sept. 1978), pp. 19-21, 30-37, 51. [Covers world fleet of vessels--a number of which have capabilities for oceanographic research as well--engaged solely or primarily in geophysical survey work, including seismic, refraction-reflection, gravity, and magnetic surveys.]

* 30. "Directory of Marine Drilling Rigs", Ocean Industry (annual, in Sept. issue). [Listing of "world mobile drilling fleet" includes "drillships and barges, semisubmersibles, submersibles, and jack-ups."]

* 31. "Directory of World's Dredges and Suppliers", World Dredging & Marine Construction (annual, in January issue No. 2).

* 32. Drewry, H. P. (Shipping Consultants) Ltd., Offshore Support Craft; "Shipping Studies," Sixth Series - 1977, No. 60 (London: HPD Shipping Publications, Jan. 1978). [Describes operations of the various sectors of the world offshore support craft fleet (including the offshore tug fleet) and the functions of each vessel type in the many phases of exploration, development, and production. Analyses of the active fleet and order book include vessel age, horsepower, size, flag, and ownership. Assessment of the support craft market is based in part on questionnaire survey of 45 leading operators regarding vessel employment levels and geographic areas; and also takes into consideration charter rates, newbuilding prices, operating costs, future offshore activity, technological changes, and likely effects of other recent developments.]

*+33. Fairplay World Shipping Year Book (London: Business Publishing Division of the Financial Times, Fairplay Publications Ltd.; annual).

* 34. Fleet Data Service, FDS Guide to American Offshore Vessels (Houston, TX: The Monteith Company, Inc.; annual).

* 35. Fleet Data Service, FDS Guide to Major American Tug Fleets (Houston, TX: The Monteith Company, Inc.; annual).

* 36. Fleet Data Service, Reserve Salvage Vessels of the U.S.A.; prepared for Maritime Administration (Houston, TX: 1978). [Coverage includes tug, tug-supply, salvage, and other vessel types.]

37. The Fish Boat (Mandeville, LA: H. L. Peace Publications, monthly).

* 38. The Fishermen's News, "Pacific Fisheries Review" edition, Vol. 35, No. 3 (Feb. 1979). [Contains listings of "U.S.-Flag High Seas Tuna Fleet", pp. 47-50, and "Alaska Shellfish Fleet", pp. 115, 117, 119, 121, 123.]

39. The Fishermen's News (Seattle, WA: Richard H. Philips Co.; semi-monthly, except 3 times in February and monthly in August and December).

40. Fishing Gazette (New York, NY: Fishing Gazette Publishing Corp.; monthly, except semi-monthly in December).

41. "Floating Power Plants", Surveyor, Vol. V, No. III (Aug. 1971), pp. 29-32.

42. "GAO Urges Navy to Save 'Millions' by Turning to Commercial Tugs, Oilers", Traffic World, Sept. 25, 1978, pp. 17-18.

43. General Accounting Office, Need for Improving Management of U.S. Oceanographic Assets, Report No. CED-78-125 (Washington: June 16, 1978).

44. Guarino, Salvadore J., "The Offshore Supply Vessel as a Naval Auxiliary"; paper before Gulf Section, Society of Naval Architects and Marine Engineers, Biloxi, MS, Sept. 27, 1974; Marine Technology, Vol. 12, No. 4 (Oct. 1975), pp. 405-416.

45. Guarino, Salvadore J., "Practical Aspects of Towing Vessel Design," paper before 4th International Tug Convention, New Orleans, LA, Oct. 20-23, 1975.

46. Hawkins, Seth, Naval Ship Research and Development Center, Naval Applications of Oceangoing Push Tug/Barge (Multi-Section Ship) Systems, Report 4224 (Washington: U.S. Government Printing Office, July 1973).

47. Heise, Richard E., Jr., Naval Ship Research and Development Center, Systems Development Department, National Defense Features Criteria, Navy/MarAd Design Team Support Study, Report SDD-11-0-15 (Bethesda, MD: Feb. 1975).

48. "Helicopter Evacuation at Sea", Proceedings of the Marine Safety Council, Vol. 35, No. 4 (Apr. 1978), pp. 51-53.

49. Hendrickson, LCDR M. Darnell, USCG, "Coast Guard Missions and Tasks," memorandum to Committee on Defense Utility of Commercial Maritime Assets, Maritime Transportation Research Board, National Research Council, Aug. 10, 1978.

50. Hovering Craft & Hydrofoil (51 Welbeck St., London W1M 7HE, England: bimonthly).

51. Howard, Weil, Labouisse, Friedrichs Inc., Research Department, Marine Transportation Industry: Investment Update (New Orleans: Nov. 1978). [Coverage includes tugs, offshore service and supply vessels, derrick barges, pipe-laying and -burying barges, drillships, and semisubmersibles.]

*+52. International Shipping and Shipbuilding Directory (London: Benn Brothers Ltd., annual).

53. Kelly, Paul L., "Offshore Industry Progress - Past and Present," paper before 51st National Convention and 1977 American Merchant Marine Conference, Propeller Club of the United States, Galveston, TX, Oct. 14, 1977. [Scope includes offshore service and supply vessels, towing vessels, barges, and drilling tenders.]

54. Land Drilling and Oilwell Servicing Contractors Directory (Tulsa, OK: Petroleum Publishing Co., annual).

* 55. Lloyd's Directory of Tug and Supply Vessels (Colchester, Essex, England: Lloyd's of London Press, Ltd., annual).

* 56. Lloyd's Register of Shipping (Crawley, West Sussex, England: Lloyd's Register of Shipping Printing House, annual; data files continually updated). [Coverage is similar to that of the ABS Record (q.v., Reference 4, above) and includes over 60,000 vessels worldwide.]

57. Loughry, Thomas, "Boomtime in the Dredging Industry", Surveyor, Vol. X, No. I (Feb. 1976), pp. 2-8.

58. Maine Commercial Fisheries (Stonington, ME: Fisheries Communications, monthly).

*+59. Marine Directory [published by Marine Engineering/Log; Worldwide Edition] (Bristol, CT: Simmons-Boardman Publishing Corp.,

annual). [Listings include owner-operators of tugs, barges, ITB systems, offshore service and supply vessels, drillships and semisubmersibles, dredges, floating drydocks, ferries, and salvage vessels.]

+60. Marine Engineering/Log, "Annual Review and Yearbook Issue" (annual, June 15 issue).

61. Marine Engineering/Log (Bristol, CT: Simmons-Boardman Publishing Co.; monthly, except semi-monthly in June).

62. Marine Management Letter (Houston, TX: Fleet Data Service, monthly). [Coverage includes offshore service, supply, and support vessels.]

* 63. "Marine Transportation Report", Offshore (annual, in March issue). [Includes "annual boat census" based on survey of owner-operators of "offshore service, supply, and support vessels," worldwide. Coverage includes tugs, offshore service and supply vessels, and other types of support vessels.]

* 64. "Marine Transportation Survey", Ocean Industry (annual, in Feb. issue). [Includes "Survey of Offshore Crewboats, Supply Vessels, and Tugs," worldwide.]

65. Maritime Administration, Office of Domestic Shipping, Division of Domestic Ocean Shipping, Deployment of the Offshore Tug/Supply Vessel in a Potential Waterborne Containerized Feeder Service (Washington: 1978).

*+66. Maritime Administration, Office of Ship Construction, Division of Production, Report on Survey of U.S. Shipbuilding and Repair Facilities (Washington: annual; published each December). [Coverage includes floating drydocks.]

67. Maritime Reporter & Engineering News (Waterbury, CT: semi-monthly).

*+68. McLeavy, Roy (ed.), Jane's Surface Skimmers (London: B.P.C. Publishing Ltd., annual). [Catalog describing all Jane's annual reference guides is available from: Franklin Watts, Inc., Dept. SJ, 730 Fifth Ave., New York, NY 10019.]

69. Military Traffic Management Command, Transportation Engineering Agency, An Analysis of CONUS Inland Waterways for National Defense, MTMC Report OA 77-11 (Washington: Sept. 1978).

*+70. Morrison, Colin (ed.), Directory of Shipowners, Shipbuilders, and Marine Engineers [published by Marine Week magazine] (New York: The International Publications Service, annual).

71. Mulcahy, Michael, "A Time for Decision on the Federal Oceanographic Fleet", Sea Technology, Vol. 19, No. 6 (June 1978), pp. 10-11, 29, 34.

72. "Multi-Purpose Harbor Service Craft", MARATECH R&D Technology Transfer Journal [Maritime Administration, Office of Commercial Development], Vol. II, No. 1 (Aug. 1979). [Summarizes joint study, by City of Tacoma and Maritime Administration, to "establish protective service needs in U.S. ports and develop general performance characteristics for a multi-purpose harbor service craft. Based on the study,...Tacoma procured 2 surface effect ships to replace the present displacement fire boat."]

73. "Murphy Pacific Marine Salvage Company" (Emeryville, CA, and New York, NY: undated). [This 12-page corporate brochure briefly

describes the salvage service and commercial operation of the ARS-type salvage vessel.]

74. Murphy Pacific Marine Salvage Company, Merritt Division, "Motor Salvage Vessels" (New York: Rev. May 31, 1977; 3-pg. data sheet). [Describes ARS-type vessel characteristics, salvage equipment, and capabilities.]

75. National Fisherman (Camden, ME: monthly, except semi-monthly in April).

76. National Marine Fisheries Service, Resource Statistics Division, Fisheries of the United States (Washington: U.S. Government Printing Office; annual).

77. National Marine Fisheries Service, Resource Statistics Division, Fishery Statistics of the United States (Washington: U.S. Government Printing Office). [Annual statistical digest.]

* 78. National Oceanic and Atmospheric Administration, Ships of the NOAA Fleet (Washington: Sept. 1977).

79. Naval Air Engineering Center, Air Capable Ships Helicopter Facility Resume, Rev. F, NAEC-ENG-7576 (Lakehurst, NJ: Jan. 1, 1977).

80. Naval Air Systems Command, Aviation Facility Ship Certification, Helicopter Facilities Bulletin No. 1C, NAEC 91122 (Washington: Mar. 31, 1976).

81. Naval Oceanography Command and University-National Oceanographic Laboratory, Oceanographic Ship Operating Schedules (Bay Saint Louis, MS: Naval Oceanography Command, annual).

82. Naval Sea Systems Command, Coastal Patrol and Interdiction Craft (Washington: undated).

83. Naval Ship Research and Development Center, Mobile Systems Support Group; Hunters Point Naval Shipyard; and Maritime Administration, Office of Ship Construction; "combined Navy/MarAd report" on Merchant Ship Expeditionary Logistic Facility, Report 4154; prepared for Naval Facilities Engineering Command (Annapolis, MD: Naval Ship Research and Development Center, Oct. 1973).

84. Nelson, Stewart B., Oceanographic Ships Fore and Aft (Washington: U.S. Government Printing Office, 1971).

85. Ocean Industry (Houston, TX: Gulf Publishing Co., monthly).

86. "Ocean Towing and Tug-Barge Systems," Marine Engineering/Log, Vol. LXXXI, No. 12 (Nov. 1976), pp. 43-59. [This section includes five separately titled articles: "Ingram's Rigid Connecting System Used in Largest Tug-Barge Combination," pp. 48-51; "Seabulk's Successful 'Catug' Consists of Catamaran Tug Locked Rigidly to Barge," pp. 52-53; "Sea-Link and Seebeck Systems Designed for Greatest Possible Relative Motion," pp. 54-55; "Transway's Artubar and Barge Train's Flexor Hinge Tug to Barge Stern," pp. 56-59; "Barge Integrator and Floater Tow River Barges at Sea," p. 59.]

87. Office of Technology Assessment, Congress of the United States, Establishing a 200-Mile Fisheries Zone (Washington: U.S. Government Printing Office, June 1977).

88. Offshore (Tulsa, OK: Petroleum Publishing Co., monthly).

89. Patterson, T.J., Jr., et al., Navy League of the United States, San Francisco Council, Maritime Affairs Committee, Utilization of the United States Merchant Marine by the Navy, position paper (San Francisco: May 18, 1976).

*+90. Ports of the World (London: Benn Brothers Ltd., annual). [Coverage includes floating drydocks.]

91. Powers, William M., "San Diego's Tuna Fleet", U.S. Naval Institute Proceedings, Vol. 105, No. 1 (Jan. 1979), pp. 66-77.

92. Proceedings, 2nd International Offshore Craft Conference, London, 1976 (London: Thomas Reed Industrial Press, 1977). [Comprises 22 papers. Topics include: mooring equipment; vessels in support of offshore operations in the areas of safety, service, defense, surveying, and supply; piloting, drilling, salvage, and towage vessels; concrete as a hull material; collision avoidance and integrated navigation; waste disposal at sea; thrusters for dynamic positioning; autopilots; chartering; manpower; weather forecasting; and safe maneuvering.]

93. Sea Technology (Arlington, VA: Compass Publications, Inc., monthly).

*+94. Seatrade U.S. Yearbook (Colchester, Essex, England; and New York: Seatrade Publications Ltd., annual). [Coverage focuses mainly on deepsea shipping, but includes tugs, barges, offshore service and supply vessels, salvage vessels, and floating drydocks.]

95. "SIU Blasts Use of Navy Tugs at King Bay Base", The Log [Seafarers International Union of North America, AFL-CIO], July 1978, p. 3.

96. Thomas, Warren D., and Peter S. Barracca, "The Salvor and the Prevention of Water Pollution by Marine Transportation", Fairplay International Shipping Journal, 1973; 10-part series: (1) Mar. 29, pp. 62-63; (2) Apr. 12, pp. 77-79; (3) Apr. 19, pp. 24-25; (4) May 10, pp. 36-37; (5) May 17, pp. 37-38; (6) May 24, pp. 65-66; (7) June 7, pp. 44-45; (8) June 28, pp. 31-32; (9) July 5, pp. 39-40; (10) Aug. 2, pp. 37-39. [Describes a number of salvage operations that included use of ARS-type salvage vessels, specially outfitted barges, U.S. Navy medium lift craft, local tugs and conventional cargo barges.]

97. Tomassoni, Carlos, et al., Hydronautics, Inc., Multi-Section Ship Feasibility and Concept Design Study; prepared for Naval Ship Research and Development Center (Laurel, MD: Hydronautics, Inc., Mar. 1974).

* 98. Trillo, Robert L. (ed.), Jane's Ocean Technology (London: B.P.C. Publishing Ltd., annual). [Coverage of operators and fleets includes oil and gas exploration rigs, tugs and supply vessels, research and survey vessels, and oil spill recovery and containment systems, among others. See also note under Reference 68, above.]

* 99. University-National Oceanographic Laboratory System, "List of Research Vessels (over 20 Meters) Operated by UNOLS Member Institutions", Rev. May 1978 (Woods Hole, MA: annual).

*100. University-National Oceanographic Laboratory System, "Material Condition Review: Ship Operations, Construction, and Conversion" (Woods Hole, MA: unpublished). [Completed, detailed forms, covering regularly scheduled inspections of all UNOLS vessels by joint Navy-National Science Foundation teams, are available from UNOLS files.]

*101. University-National Oceanographic Laboratory System, "Ship Characteristics Form" (Woods Hole, MA: unpublished). [Completed, detailed forms on all UNOLS vessels are available from UNOLS files.]

102. U.S. Congress, House, Subcommittee on Advanced Energy Technologies and Energy Conservation Research, Development and

Demonstration of the Committee on Science and Technology, Energy from the Ocean, Report (prepared by Science Policy Research Division, Congressional Research Service, Library of Congress), Committee Print, Serial CC, 95th Cong., 2d Sess., 1978.

103. Weeks, Ann, "The Fleet That Flies School Flags", Surveyor, Vol. X, No. 1 (Feb. 1976), pp. 16-23. [Describes U.S. oceanographic research vessels.]

104. Wheeler, L. A. (Director, Office of Maritime Affairs, Naval Sea Systems Command, 97D), "Commercial Heavy Lift Equipments"; memorandum to Commander, Naval Facilities Engineering Command (NAVFAC 031A); Ref. 07D/TRM Ser 116; Aug. 9, 1976. [Scope includes offshore service and supply vessels, liftships, drillships, and lift barges.]

+105. Work Boat, "Construction" issue (annual, December issue). [Lists vessels delivered, on order, and under construction. Types include tugs, crew boats, supply vessels, dredges, and others.]

106. Work Boat (Mandeville, LA: H. L. Peace Publications, monthly.

107. World Dredging & Marine Construction (Long Beach, CA: Symcon Publishing Co.; monthly, except semi-monthly in Jan. and Sept.)

*108. World Dredging Directory (Long Beach, CA: Symcon Publishing Co., annual).

APPENDIX D

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18. SUPPLEMENTARY NOTES

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Auxiliary Ships	Ship Descriptions (Barges)
Defense Shipping	Ship Descriptions (Fishing Vessels)
Directories (Ship Owners)	Ship Descriptions (Oceanographic)
Emergency Contingency Plans	Ship Descriptions (Offshore Supply)
	Ship Descriptions (Tugs)

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report identifies military functions, required in an emergency or mobilization, whose performance may require the use of vessels and craft that normally are not included in contingency planning; and describes the types, characteristics, and potential availability of vessels and craft that appear to have utility for these functions. Its scope excludes vessels owned or operated by the Department of Defense and the Coast Guard; oceangoing commercial cargo ships, which already are included in national contingency

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20. Abstract (continued)

planning; and foreign-owned vessels.

Vessel types included are: ocean-classed tugs, ocean-classed barges, crane and derrick barges, offshore service and supply vessels, drillships and semisubmersibles, five categories of fishing vessels, oceanographic research vessels, dredges, floating drydocks, motor yachts, passenger-vehicle ferries, marine salvage vessels, and advanced marine vehicles (air cushion vehicles, surface effect ships, and hydrofoils).

The report identifies 13 general military functions that could be filled in whole or in part by the 17 types of vessels studied and provides 8 basic information sources to military planners and industry personnel. Three summary tables permit quick identification of (1) the suitability of vessel types for each military function, (2) the relative essentiality of vessel capabilities for each military function, and (3) the capabilities of each vessel type. The report also provides (4) a general description of each industry sector, covering vessel numbers, uses, manning practices, commercial arrangements, geographical distribution, and availability; (5) Vessel Characteristics forms that summarize, for each vessel class within vessel type, the typical characteristics that are important for evaluation by military planners; (6) general layout drawings or illustrations of most of the vessel classes; (7) a listing of principal vessel owners, operators, and industry associations, with addresses, from whom more specific information can be obtained; and (8) a selective bibliography of vessel data sources for further reference.

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